MONTHLY WEATHER REVIEW.

Acting Editor: Alfred J. Henry.

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INTRODUCTION.

The MONTHLY WEATHER REVIEW for September, 1897, is based on 2,864 reports from stations occupied by regular and voluntary observers, classified as follows: 144 from Weather Bureau stations; numerous special river stations; 33 from post surgeons, received through the Surgeon General, United States Army; 2,525 from voluntary observers; 96 received through the Southern Pacific Railway Company; 14 from Life-Saving stations, received through the Superintendent United States Life-Saving Service; 32 from Canadian stations; 20 from Mexican stations; 7 from Jamaica, W. I. International simultaneous observations are received from a few stations and used, together with trustworthy newspaper extracts and special reports.

Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Mr. Curtis J. Lyons, Meteorologist to the Government Survey, Honolulu; Dr. Mariano Bárcena, Director of the Central Meteorological Observatory of Mexico; Mr. Maxwell Hall, Government Meteorologist, Kingston, Jamaica; and Commander J. E. Craig, Hydrographer, United States Navy.

The REVIEW is prepared under the general editorial supervision of Prof. Cleveland Abbe. For the present month the duties of the Editor have been assumed by Mr. A. J. Henry, Chief of the Division of Records and Meteorological Data.

Attention is called to the fact that the clocks and self-registers at regular Weather Bureau stations are all set to seventy-fifth meridian or eastern standard time, which is exactly five hours behind Greenwich time, and, as far as practicable, only this standard of time is used in the text of the REVIEW, since all Weather Bureau observations are required to be taken and recorded by it. The standards used by the public in the United States and Canada and by the voluntary observers are believed to generally conform to the modern international system of standard meridians, one hour apart, beginning with Greenwich. Records of miscellaneous phenomena that are reported occasionally in other standards of time by voluntary observers or newspaper correspondents are generally corrected to agree with the eastern standard; otherwise, the local meridian is mentioned.

CLIMATOLOGY OF THE MONTH.

GENERAL CHARACTERISTICS.

September is one of the most pleasant months of the year. The heat of summer in northern latitudes begins to yield to the more invigorating air of autumn, the nights are cooler, the air is drier, and a sort of crispness prevails that is in marked contrast to the oppressive heat of midsummer. As compared with August, the rainfall is generally less, except on the south Atlantic and north Pacific coasts. The atmospheric pressure is greater, except on the Florida and north Pacific coasts, where the pressure decreases from August to September and the rainfall increases.

The winds of September do not blow uniformly from any one direction. On the New England Coast they are westerly or southwesterly; on the middle and south Atlantic coasts they are generally easterly or northeasterly; south of the thirty-fifth parallel of north latitude the general direction is easterly; in the middle and upper Mississippi valleys and in the Lake Region, westerly or southwesterly; on the Pacific Coast, westerly.

The most noteworthy feature of September, 1897, was the continuation of the drought referred to in the August REVIEW. While the drought was more severe in some localities than in others, as will be shown in the subsequent treatment of the subject, yet drought conditions were general east of the Rocky Mountains, except in Florida and on the Georgia Coast.

Heavy rains fell in Arizona and southern New Mexico, and generally the rainfall of the Pacific Coast was normal or nearly so.

Pressure was higher than usual, especially in the Lake Region and the Ohio Valley, where averages of 30.19 inches for the month were recorded at several stations.

Temperature was unusually high in the upper Mississippi and Missouri valleys and generally above normal elsewhere, except in Florida and on the north Atlantic and the Pacific coasts.

No storm of wide extent occurred within the borders of the United States, although several West India hurricanes passed near Gulf and Atlantic Coast stations, the most noteworthy being those of the 13th and 21st. The first-named was severe on the Texas Coast, where 13 lives were lost, owing to high winds and tides, and property valued at $150,000 was destroyed. The hurricane of the 21st skirted the south Atlantic Coast and disappeared south of New England on the 24th. Reports from incoming vessels indicate that it was quite severe off Hatteras on the 22d.

Extensive forest fires prevailed in Wisconsin, Michigan, Indiana, and Ohio; in some cases the smoke interfered with navigation on the Great Lakes.

ATMOSPHERIC PRESSURE.

[In inches and hundredths.]

The distribution of mean atmospheric pressure reduced to sea level, as shown by mercurial barometers, not reduced to standard gravity, and as determined from observations taken daily at 8 a. m. and 8 p. m. (seventy-fifth meridian time), is shown by isobars on Chart IV. That portion of the reduction to standard gravity that depends on latitude is shown by the numbers printed on the right-hand border.

The general configuration of the isobars on Chart IV is closely in accord with normal September conditions. It is to be noticed, however, that the geographic position of the area of highest pressure, usually on the Piedmont Plateau, was this year quite a distance inland, viz, over the Ohio Valley and Lake Region.

It is generally conceived that the September high in the eastern part of the United States is an extension of the great ocean high that stretches westward from the Azores between the thirty-fifth and fortieth parallels. The increase in pressure from August to September in the present case would seem to be greater over land areas than over adjacent water surfaces. The greatest increase occurred in the Lake Region and Ohio Valley, although there was a marked increase in all sections save portions of Montana, South Dakota, and the middle Plateau. Pressure was high at Bermuda, although the comparative increase was much less than at stations in the Ohio Valley. The numerical values of Tables I and III should be consulted for further details.

AREAS OF HIGH AND LOW PRESSURE.

By Prof. H. A. HAZEN.

During September there were nine highs and eleven lows of sufficient definiteness to be charted (see Maps I and II at the end of this REVIEW). The accompanying table gives the principal facts as to place of origin and disappearance, duration, length, and velocity of each high and low. In making up the mean data, low No. XI was omitted for the reason that there was only the beginning of a storm, it having been kept back and finally dissipated by the high to the north.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocities.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long W.	Length.	Duration.	Daily.	Hourly.
High areas.		°	°		°	°	*Miles.*	*Days.*	*Miles.*	*Miles.*
I	1, a. m.	50	86	6, a. m.	39	79	1,410	5.0	282	11.8
II	6, a. m.	49	87	9, p. m.	33	79	2,040	3.5	583	24.3
III	7, p. m.	39	125	12, p. m.	41	68	3,420	5.0	684	28.5
IV	10, p. m.	46	128	17, p. m.	26	82	4,320	7.0	617	25.7
V	13, a. m.	38	125	18, a. m.	33	100	2,820	5.0	564	23.5
VI	18, a. m.	52	117	23, a. m.	44	59	3,360	5.0	672	28.0
VII	21, a. m.	43	110	24, a. m.	30	92	1,440	3.0	480	20.0
VIII	22, a. m.	47	121	24, a. m.	44	111	720	2.0	360	15.0
IX	25, a. m.	51	109	30, p. m.	36	78	2,460	5.5	447	18.6
Total							21,990	41.0	4,689	
Mean of 9 tracks							2,443		521	21.7
Mean of 41 days									536	22.3
Low areas.										
I	1, a. m.	52	117	4, a. m.	53	101	1,140	3.0	380	15.8
II	4, p. m.	54	108	11, a. m.	48	53	3,900	6.5	600	25.0
III	10, p. m.	24	83	14, a. m.	34	99	1,260	3.5	360	15.0
IV	10, p. m.	51	117	14, a. m.	47	59	2,760	3.5	789	32.9
V	12, a. m.	51	124	18, a. m.	49	53	3,600	6.0	600	25.0
VI	16, p. m.	54	114	21, a. m.	48	64	3,480	4.5	773	32.2
VII	18, p. m.	47	125	21, a. m.	50	89	1,740	2.5	696	29.0
VIII	20, a. m.	23	85	25, a. m.	48	59	2,580	5.0	516	21.5
IX	23, p. m.	55	111	27, a. m.	49	57	2,580	3.5	737	30.7
X	26, a. m.	53	121	30, p. m.	52	70	3,060	4.5	680	28.3
XI*	27, a. m.	25	86	30, p. m.	28	86	600	3.5	171	7.1
Total							26,100	42.5	6,131	
Mean of 10 tracks							2,610		613	25.5
Mean of 42.5 days									614	25.6

* Not used in final summary.

HIGHS.

In the first half of the month the general tendency of highs was along the northern border of the country; during the latter half their tendency was more across the country. The velocity of apparent motion was very slow at the opening and closing of the month, but one and a half to twice as fast in the middle.

Four highs began on the Pacific Coast, two in Montana, two over Lake Superior, and one in Wyoming. Six disappeared on the Atlantic Coast, one in Wyoming, one in Texas, and one on the middle Gulf Coast.

LOWS.

For the first time this season the conditions have been favorable for West India storms. The first of these, No. III, began to the north of Cuba on the 10th, p. m., though there had been a slight disturbance forming for several days previously. The storm traveled very slowly (15 miles per hour) a little to the north of west and finally disappeared in Texas morning of 14th. The lowest pressure noted was 29.58 off Galveston, p. m. of 12th. The heaviest rain in twenty-four hours was 1.12 inch at Mobile, p. m. of 12th, showing a rather remarkable deficiency, and possibly one reason for the rapid dissipation of the storm on reaching the land. The highest wind of the storm was at Port Eads, 72 miles per hour, northeast, a. m. of 12th, and the next highest was 42 miles at New Orleans, a. m. and p. m. of 12th. Another Gulf storm, No. VIII, began with a disturbance in the southeast Gulf before the 20th. Its motion was rather slow (21.5 miles) to a point a little east of north, reaching the Gulf of St. Lawrence, a. m. of 25th. The lowest pressure noted was 29.62 off Savannah, a. m. of 22d. Phenomenal rains attended this storm on the west Florida Coast and off the south Atlantic Coast, except in south Florida. Tampa reported 6.56 inches in twenty-four hours, a. m. of 21st; Jacksonville, 5.40 inches, p. m. of 21st; Savannah, 2.78 inches, a. m. of 22d, and Charleston, 1.48 inch, same date. Jupiter (170 miles from Tampa) had only 0.01 of an inch of rain, and the same amount fell at Key West. The highest wind was 50 miles per hour at Charleston, a. m. of 22d. In both of these storms all shipping and Gulf and south Atlantic ports received ample warning of high winds.

The third Gulf storm was first noted as a slight disturbance off west Cuba, a. m. of the 25th, the pressure at Habana having fallen off 0.10 in twenty-four hours. This disturbed condition practically continued in the east and southeast Gulf throughout the storm. Light rains were experienced. The highest wind, 48 miles northeast, was noted at Port Eads, a. m. of the 30th.

Aside from these Gulf storms, all the lows of the month had a trajectory north of this country. They all began to the north of Montana and Washington. No. I disappeared in Manitoba, No. VII to the north of Lake Superior, and all the rest over or very near Newfoundland.

The most remarkable characteristic of these lows has been their lack of rainfall. Leaving out of the count the coast stations, only ten have reported a fall of over 1 inch in twenty-four hours during the whole month. As low No. II was hovering over North Dakota the highest temperature ever experienced in September at Bismarck was noted, 102°, p. m. of the 7th. This low was followed in the same track by No. IV, and the two caused phenomenal heat in the middle and northern States about the Mississippi and Ohio valleys. On the 9th the highest temperatures ever noted in first ten days of September were reported from Alpena and Marquette.

Another marked peculiarity of these highs and lows was the lack of high winds. Many times during the month very steep barometric gradients between highs and lows occurred, but almost invariably without any high winds. Aside from

the coast stations, during the Gulf storms, the reports have shown quiet airs in general. The motion of cirrus has been remarkably uniform from west to east, except on the coasts. This has been due to the moderate character of the lows or to their lack of intensity, their influence rarely extending as high as cirrus.

LOCAL STORMS.

By A. J. HENRY, Chief of Division of Records and Meteorological Data.

There were very few severe local storms during the month. Two West India hurricanes crossed the Gulf and South Atlantic coasts, causing dangerous winds and destructive tides at a few points. The most serious disasters occurred on the Texas Coast about 7:30 p. m. of the 13th. Thirteen lives were lost and property to the value of $150,000 was destroyed, the destruction being due to the combined forces of high winds and tides.

One low area storm moved from the upper Missouri Valley on the 14th to the Atlantic Coast, reaching the latter on the 17th. This disturbance was accompanied by severe thunder storms throughout the Missouri Valley, the Lake Region, and the Ohio Valley.

A West India hurricane passed northeastward across the Peninsula of Florida on the 20th, thence along the Atlantic Coast, finally disappearing south of New England on the 24th. The winds were not unusually dangerous, although considerable damage was done to exposed property on the beach. Reports from vessels that encountered the storm indicate that its center was several hundred miles east of the coast line.

TEMPERATURE OF THE AIR.

[In degrees Fahrenheit.]

The temperature was below normal on the Pacific Coast and in Florida, and there were also slight deficiencies in New Jersey, New York, and generally throughout New England. Elsewhere the month was unusually warm, especially so in the States of Iowa, Illinois, Missouri, Kansas, Nebraska, North Dakota, South Dakota, and Minnesota. In this large region the DAILY excesses of temperature exceeded 5° on the average of the month. Maximum temperatures, ranging from 90° to 100°, prevailed almost continuously from the 1st to the 16th. Prostrations, and in a few cases deaths, due to the extreme heat occurred in Chicago on the 9th, 10th, 11th, 13th, 14th, and 15th. The unusual heat was coupled with clear skies, southwesterly winds, and a low degree of humidity, conditions which are not especially hurtful to the human organism, however injurious they may be to vegetable life. Cool nights in many localities greatly lessened the discomfort of the heat. Serious bodily discomfort is rarely experienced except when the minimum temperature, or the temperature of nighttime, does not fall below 75°. It will be noticed that in the majority of cases in the table following that the temperature of nighttime fell to or below 75°; also, that the temperature of evaporation and the relative humidity were low, except in a few cases. No prostrations by heat were reported from the harvest fields or in the smaller towns and cities.

On the 14th an area of cloud and rain formed in Kansas and Nebraska and passed eastward, reaching the Atlantic Coast on the 17th, bringing relief from the unseasonable temperatures that had prevailed since the first of the month. The temperature rose after the passage of the storm, and the month closed with temperatures generally above the normal.

The mean temperatures and the departures from the normal, as determined from records of the maximum and minimum thermometers, are given in Table I for the regular stations of the Weather Bureau, which also gives the height of the thermometers above the ground at each station. The mean temperature is given for each station in Table II, for voluntary observers.

Climatic statistics during the continuance of the hot weather.

CHICAGO, ILL.

September, 1897.	Max. temp.	Min. temp.	Wet thermometer 8 a.m.	Wet thermometer 8 p.m.	Relative humidity 8 a.m.	Relative humidity 8 p.m.	Daily wind movement.
	°	°	°	°	%	%	*Miles.*
1	71	65	60	67	60	86	344
2	69	64	63	65	88	85	397
3	71	66	63	66	78	81	401
4	76	62	58	68	65	75	405
5	85	64	59	67	66	40	382
6	85	71	61	68	52	66	344
7	84	68	60	66	52	53	361
8	92	74	62	70	45	41	389
9	94	73	63	66	48	32	362
10	94	70	63	68	52	54	361
11	73	67	68	68	90	93	389
12	86	70	69	72	82	77	223
13	82	72	63	70	54	86	308
14	91	72	71	70	86	44	258
15	91	74	67	77	64	64	491
16	81	64	70	62	82	66	361
Mean	83	68	64	68	66	65	361

BISMARCK, N. DAK.

1	74	54	53	66	87	65	224
2	96	62	64	69	89	33	306
3	100	75	64	65	50	24	422
4	84	61	58	60	74	29	210
5	87	54	48	62	43	30	260
6	90	60	57	68	79	43	312
7	102	58	57	64	86	18	154
8	100	62	60	65	42	52	303
9	67	49	46	53	79	42	273
10	63	48	45	54	79	55	198
11	86	56	54	67	80	43	231
12	78	55	57	58	87	41	141
13	83	56	50	70	65	67	255
14	84	61	62	57	78	32	276
15	63	42	43	43	86	90	241
16	58	32	31	46	85	58	157
Mean	82	55	53	60	74	45	251

OMAHA, NEBR.

1	99	74	67	72	70	36	216
2	97	72	68	70	78	39	178
3	94	71	66	69	73	38	272
4	96	70	64	69	61	34	258
5	98	78	68	70	50	38	240
6	92	71	64	67	66	38	227
7	92	69	64	70	70	40	248
8	90	72	66	69	69	39	277
9	92	72	66	70	73	44	195
10	84	61	58	72	79	78	108
11	86	67	67	74	92	63	125
12	93	73	69	72	84	48	122
13	93	72	65	69	67	38	142
14	86	72	67	70	70	54	232
15	86	68	68	74	95	72	109
16	76	50	49	50	76	44	338
Mean	91	69	65	69	73	46	205

ST. LOUIS, MO.

1	96	75	70	73	78	42	161
2	94	75	68	74	65	48	166
3	93	72	68	73	75	54	194
4	91	67	63	67	70	36	160
5	93	70	64	67	70	34	153
6	93	68	67	68	82	35	136
7	95	71	62	72	48	41	151
8	95	74	69	68	67	32	156
9	96	74	66	68	60	33	164
10	96	75	66	70	62	36	154
11	95	77	69	73	65	54	140
12	98	74	68	67	64	27	88
13	95	74	66	73	57	49	146
14	96	73	69	72	74	44	180
15	98	75	70	73	74	42	208
16	91	69	71	70	63	84	269
Mean	95	73	67	70	66	43	164

The *monthly mean temperatures* published in Table I, for the regular stations of the Weather Bureau, are the simple means of all the daily maxima and minima; for voluntary

stations a variety of methods of computation is necessarily allowed, as shown by the notes appended to Table II. The mean temperatures given in Table III for Canadian stations are the simple means of 8 a. m. and 8 p. m. simultaneous observations.

The *regular diurnal period* in temperature is shown by the hourly means given in Table V for 29 stations selected out of 82 that maintain continuous thermograph records.

The *distribution of the observed monthly mean* temperature of the air over the United States and Canada is shown by the dotted isotherms on Chart IV; the lines are drawn over the Rocky Mountain Plateau region, although the temperatures have not been reduced to sea level, and the isotherms, therefore, relate to the average surface of the country occupied by our observers; such isotherms are controlled largely by the local topography, and should be drawn and studied in connection with a contour map.

Considered by districts the mean temperatures of the current month show departures from the normal as given in Table I. The greatest positive departures were: North Dakota, 9.5; upper Mississippi, 7.9; Missouri Valley, 9.0. The greatest negative departures were: Florida Peninsula, 1.8; north Pacific, 0.8.

In Canada, Prof. R. F. Stupart says:

> The mean temperature of the month exceeded the average by 8° to 10° in Manitoba, and thence both westward and eastward the excess diminished. Alberta showed an excess of from 2° to 4°, and near the British Columbia Coast the mean was very nearly average. Eastward, Thunder Bay, Algoma, and Nipissing districts and counties near Lake Huron showed an excess of from 3° to 5°; near Lake Ontario and along the upper St. Lawrence the temperature was just average, and in Quebec and the Maritime Provinces ranged from average to about 2° below.

Accumulated monthly departures from normal temperatures from January 1 to the end of the current month are given in the second column of the following table, and the average departures are given in the third column, for comparison with the departures of current conditions of vegetation from the normal condition.

Districts.	Accumulated departures.		Districts.	Accumulated departures.	
	Total.	Average.		Total.	Average.
	°	°		°	°
New England	+ 3.9	+ 0.4	Southern Slope	0.0	0.0
Middle Atlantic	+ 1.6	+ 0.2	Florida Peninsula	— 1.8	— 0.2
South Atlantic	+ 1.3	+ 0.1	Southern Plateau	— 5.2	— 0.6
East Gulf	+ 2.9	+ 0.3	Middle Plateau	— 5.7	— 0.6
West Gulf	+ 9.0	+ 1.0	Middle Pacific	— 2.3	— 0.3
Ohio Valley and Tenn.	+ 2.9	+ 0.3	South Pacific	— 4.9	— 0.5
Lower Lake	+ 4.9	+ 0.5			
Upper Lake	+14.7	+ 1.6			
North Dakota	+ 3.7	+ 0.4			
Upper Mississippi Valley	+ 9.6	+ 1.1			
Missouri Valley	+ 9.8	+ 1.1			
Northern Slope	+ 3.0	+ 0.3			
Middle Slope	+ 8.6	+ 1.0			
Northern Plateau	+ 8.3	+ 0.9			
North Pacific	+ 0.4	0.0			

The *years of highest and lowest mean temperatures* for September are shown in Table I of the REVIEW for September, 1894. The mean temperature for the current month was the highest on record at: Memphis, 78.0; Marquette, 63.2; Chicago, 69.5; Milwaukee, 67.3; Green Bay, 66.0; Duluth, 62.6; Moorhead, 65.6; Bismarck, 67.1; Williston, 64.0; Minneapolis, 68.8; St. Paul, 67.6; La Crosse, 68.0; Davenport, 72.2; Des Moines, 73.7; Dubuque, 69.9; Keokuk, 74.4; Cairo, 75.8; Springfield, Ill., 73.2; Hannibal, 73.4; St. Louis, 77.4; Columbia, Mo., 75.8; Kansas City, 76.8; Springfield, Mo., 75.8; Topeka, 75.4; Omaha, 75.2; Sioux City, 71.8; Pierre, 71.7; Huron, 69.4; Yankton, 72.7; Rapid City, 68.8; Cheyenne, 61.8; North Platte, 70.8; Denver, 66.4; Concordia, 75.3; Dodge City, 73.2; Wichita, 75.2.

The *years of highest maximum and lowest minimum temperatures* for September are given in the last four columns of Table I of the REVIEW for September, 1896. During the current month the maxima temperatures were equal to or above the highest on record at: Eastport, 89; Portland, Me., 94; Northfield, 90; Woods Hole, 85; Block Island, 86; Narragansett Pier, 90; Harrisburg, 95; Atlantic City, 94; Lynchburg, 99; Raleigh, 98; Pensacola, 94; Louisville, 100; Indianapolis, 96; Cincinnati, 97; Parkersburg, 99; Sandusky, 96; Toledo, 95; Alpena, 94; Grand Haven, 92; Port Huron, 95; Sault Ste. Marie, 91; Milwaukee, 95; Bismarck, 102; Des Moines, 98; Hannibal, 98; Eureka, 82; Point Reyes Light, 92. The minimum temperatures were the lowest on record at: Savannah, 46; Key West, 69.

FROST.

Frost was observed as follows: Alabama, light on the 22d at Florence and Riverton. Arkansas, light frost generally on the 21st, 22d, and 23d; killing on the 21st at Keesees Ferry and Silver Springs. Colorado, light frosts occurred on the 1st, 9th, 10th, 14th, and 15th, and on other dates; killing on the 16th, 17th, 18th, and other dates. Florida, light on the 21st at Chipley, Orange Hill, and Vernon, Washington County; a very unusual occurrence. Georgia, light on the 24th and 30th at Diamond, Ramsey, and Clayton. Idaho, killing on the 3d, and on subsequent dates. Illinois, killing frost at Danville on the 20th. Indiana, killing on the 19th, and on subsequent dates. Iowa, 20th, heavy to killing frosts generally in northern portion and light to heavy in southern portion. Kansas, light frosts occurred on the 17th in Johnson County, on the 18th in Johnson and Franklin, and on the 20th and 21st in Johnson, Franklin, Marshall, Coffey, Greenwood, Wilson, Neosho, and Cherokee. Kentucky, killing at a number of places on the 21st and 22d. Maryland, killing at a few places on the 21st and 22d, also on the 26th. Minnesota, heavy frost general on the mornings of the 17th and 20th; in the southern portion of the State hardy vegetation escaped injury. Mississippi, at Pontotoc killing frost was observed on the lowlands on the 21st. Missouri, killing frost at some stations on the 20th, 21st, and 22d. Nebraska, no killing frost was observed. New England, in the northern portion general killing frost was reported on the 22d; in southern sections the frost of the 28th was commonly reported as killing. New Jersey, one station reported killing frost on the 22d and two on the 28th. New Mexico, no destructive frosts. North Carolina, killing frosts at Biltmore, 30th; Linville, 21st, 29th, and 30th; Waynesville, 30th. Oklahoma, no killing frosts were observed. Ohio, killing frosts on 18th, 20th, 21st, 22d, and other dates. South Dakota, killing frosts on the 15th, 16th, and 17th. Tennessee, general frosts on the 21st, 22d, and 23d; some damage was done to tobacco and tender vegetation. Virginia, killing frosts at elevated stations on the 21st, 22d, 29th, and 30th. West Virgina, killing frosts on the 20th, 22d, and other dates; damage slight. Wisconsin, killing frost on the 20th.

MOISTURE.

The *quantity of moisture* in the atmosphere at any time may be expressed by the weight of the vapor coexisting with the air contained in a cubic foot of space, or by the tension or pressure of the vapor, or by the temperature of the dew-point. The mean dew-point for each station of the Weather Bureau, as deduced from observations made at 8 a. m. and 8 p. m., daily, is given in Table I.

The *rate of evaporation* from a special surface of water on muslin at any moment determines the temperature of the wet-bulb thermometer. The mean wet-bulb temperature is now published in Table I; it is always intermediate, and generally about half way between the temperature of the air

and of the dew-point. The quantity of water evaporated in a unit of time from the muslin surface may be considered as depending essentially upon the wet-bulb temperature, the dew-point, and the wind.

The *relative humidity*, or the ratio between the moisture that is present in the air and the moisture that it would contain if saturated at its observed temperature is given in Table I as deduced from the 8 a. m. and 8 p. m. observations. The general average for a whole day, or any other interval, would properly be obtained from the data given by an evaporometer, but may also be obtained, approximately, from frequent observations of the relative humidity.

PRECIPITATION.

[In inches and hundredths.]

No rain fell during the month over a considerable area in northern Mississippi, western Tennessee, and parts of the adjoining States of Kentucky, Alabama, Louisiana, and Arkansas. In all there were 18 States in which the measured rainfall at one or more stations was a trace or less.

The rainfall of September is heaviest on the average along the Gulf and Atlantic coasts and over the Peninsula of Florida. Smaller areas of comparatively heavy rainfall are to be found over the lower St. Lawrence Valley and the upper Lake Region, while a fourth area occasionally appears over or west of the Continental Divide in New Mexico and Arizona.

The rainfall of September along the Gulf Coast is subject to very great variations from year to year. The heavy fall on the coast line, moreover, does not, as a rule, extend far inland; thus, in 1879, while a total of 15 inches fell on the Texas Coast, there was barely an inch 150 miles inland in a northeasterly direction. The rainfall of September in the central interior valleys and the Lake Region comes almost wholly in the form of local showers and the distribution is consequently very irregular. Furthermore, there is almost without exception regions of deficient rainfall in the central and eastern portions of the United States whose magnitude and position vary with each successive year. During the last ten years the dry regions were located as follows:

1888.—In the Missouri and Mississippi valleys, portions of the Ohio Valley, Louisiana, and Arkansas.

1889.—In North Carolina, Georgia, Mississippi, Louisiana, Michigan, Minnesota, and Nebraska.

1890.—In the upper Missouri Valley and central Illinois.

1891.—Generally deficient rainfall throughout the Mississippi Valley, Tennessee, Georgia, Virginia, and West Virginia.

1892.—In the Mississippi and Missouri valleys.

1893.—In the upper Missouri Valley and lower Lake Region.

1894.—In the upper Missouri Valley.

1895.—Gulf States, Georgia, North Carolina, South Carolina, Virginia. West Virginia, Ohio, and Kentucky, a month of generally deficient rainfall.

1896.—Mississippi, Alabama, and portions of Georgia. Generally heavy elsewhere, except in the upper Missouri Valley.

While the rainfall of September, 1897, over almost the entire territory east of the one hundredth meridian was below the normal, the deficiency was most marked in the middle and lower Mississippi Valley, the Ohio Valley, the lower Lake Region, and the Middle Atlantic Coast, a region, it will be remembered, over which unusually heavy rains fell in March and April last. The central region of heavy rains in March last (see Chart III, March, 1897, REVIEW) is almost identical with the area of least rainfall, as shown on Chart III of this REVIEW.

During the sixty-one days that ended September 30 less than 50 per cent of the normal amount of rain fell in practically the whole of the Ohio basin and the greater portion of the Mississippi and Missouri basins. At St. Louis, Springfield, Mo., Indianapolis, and Cairo less than 25 per cent of the normal amount of rain fell during the period above mentioned.

While there has been general drought east of the Rocky Mountains, the rainfall of the eastern foothills and west of the Continental Divide in Colorado, New Mexico, and Arizona was heavier than usual. This is also true of Florida, the coast of Georgia, and portions of southern Alabama.

The *distribution of precipitation* for the current month, as determined by reports from about 2,500 stations, is exhibited on Chart III. The numerical details are given in Tables I, II, and III.

The *years of greatest and least precipitation* for September are given in the REVIEW for September, 1890. The precipitation for the current month was the greatest on record at: Jupiter, 18.09; Phœnix, 3.67. It was the least on record at: Nantucket, 1.31; Vineyard Haven, 0.80; Little Rock, 0.33; Corpus Christi, 0.98; Chattanooga, 0.07; Memphis, 0.00; Nashville, 0.19; Columbus, Ohio, 0.82; Parkersburg, 0.46; Buffalo, 0.31; Rochester, 0.46; Erie, 0.54; Springfield, Ill., 0.35; Hannibal, 0.30; Springfield, Mo., 0.37; Sioux City, 0.51; Oklahoma, 1.22. The above refers only to the stations included in Table I.

The *average departure* for each district is given in Table I. By dividing each current precipitation by its respective normal the following corresponding percentages are obtained (precipitation is in excess when the percentage of the normal exceeds 100):

Above the normal: Florida Peninsula, 163; southern Plateau, 261; northern Plateau, 134.

Below the normal: New England, 62; middle Atlantic, 35; south Atlantic, 71; east Gulf, 57; west Gulf, 38; Ohio Valley and Tennessee, 24; lower Lake, 25; upper Lake, 48; North Dakota, 43; upper Mississippi, 36; Missouri Valley, 38; northern Slope, 39; middle Slope, 50; southern Slope, 78; middle Plateau, 40; north Pacific, 68; middle Pacific, 55; south Pacific, 0.

In Canada, Prof. R. F. Stupart says:

Over British Columbia and also over the eastern portion of the Maritime Provinces the rainfall was very nearly average, and in all other portions of the Dominion, except Saskatchewan and parts of Assiniboia, it was less than average, and generally to a very pronounced extent. In Manitoba it averaged but 0.3 inch; over most of Ontario it was only from 0.3 to 0.6, and the counties of Prince Edward and Hastings alone showed about 2 inches, an amount nearly approaching average. The deficiency was also very marked in the western portions of Nova Scotia and New Brunswick.

The *total accumulated monthly departures* from January 1 to the end of the current month are given in the second column of the following table; the third column gives the current accumulated precipitation expressed as a percentage of its normal value.

Districts.	Accumulated departures.	Accumulated precipitation.	Districts.	Accumulated departures.	Accumulated precipitation.
	Inches.	*Per ct.*		*Inches.*	*Per ct.*
New England	+ 1.70	102	Middle Atlantic	— 4.60	87
Florida Peninsula	+ 9.40	123	South Atlantic	— 4.90	87
Southern Slope	+ 1.20	107	East Gulf	— 3.70	81
Southern Plateau	+ 4.20	164	West Gulf	— 8.90	73
Northern Plateau	+ 0.70	106	Ohio Valley and Tenn.	— 1.10	97
South Pacific	+ 0.70	109	Lower Lake	— 3.30	87
			Upper Lake	— 2.10	92
			North Dakota	— 0.70	96
			Upper Mississippi Valley	— 0.40	99
			Missouri Valley	— 2.80	89
			Northern Slope	— 1.60	87
			Middle Slope	— 0.20	99
			Middle Plateau	— 0.20	98
			North Pacific	— 2.70	93
			Middle Pacific	— 2.60	86

SNOWFALL.

The *total monthly snowfall* at each station, if any occurs, is given in Tables I and II. The chart of geographical distribution is omitted for this month.

Light snow fell at a few points in Colorado and Wyoming on the 16th. Snow also fell at a few places in Montana on the 7th, 8th, 14th, and 15th; in Michigan at three stations on the 19th; in New York at one station on the 27th; at one station in Ohio on the 20th; in Utah at a few stations on the 23d, 28th, and 30th; in Idaho at one station on the 2d and 21st.

HAIL.

The following are the dates on which hail fell in the respective States:

Alabama, 25. Arizona, 2, 9, 11, 23, 24, 25, 28, 29. California, 12, 25. Colorado, 11, 14, 16, 22, 25. Georgia, 1. Idaho, 3, 8, 11, 13, 28. Illinois, 1, 16. Indiana, 1, 16. Iowa, 1. Maine, 22. Michigan, 1. Missouri, 16. Montana, 8. Nebraska, 1, 5, 25. Nevada, 13, 25. New Jersey, 2, 13, 21. New Mexico, 15. New York, 26. North Carolina, 1. North Dakota, 6, 14. Ohio, 1, 16, 20. Oregon, 7. Pennsylvania, 13. South Dakota, 13. Utah, 10, 11. Washington, 7. Wisconsin, 19. Wyoming, 1, 26.

SLEET.

Sleet was reported at Helena, Mont., on the 15th.

WIND.

The *prevailing winds* for September, 1897, viz, those that were recorded most frequently, are shown in Table I for the regular Weather Bureau stations.

Maximum wind velocities are given in Table I, which also gives the altitudes of Weather Bureau anemometers above the ground. Maxima of 50 miles or more per hour were reported during this month as follows (maximum velocities are averages for five minutes; extreme velocities are gusts of shorter duration, and are not given in this table):

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
		Miles				*Miles*	
Charleston, S. C	21	50	n.	Indianapolis, Ind	1	66	w.
Cleveland, Ohio	1	59	nw.	Do	16	59	w.
Do	16	66	nw.	Port Eads, La	11	72	ne.
Hatteras, N. C	3	50	nw.	Do	12	60	ne.
Idaho Falls, Idaho	13	50	sw.	Sandusky, Ohio	16	52	nw.

The high velocities at Charleston and Port Eads occurred in connection with the passage of a West India hurricane; those at Cleveland, Sandusky, and Indianapolis were recorded during the prevalence of severe thunderstorms.

The winds were severe on Lake Erie on the afternoon of the 1st. Several small yachts were capsized; one life was lost, and a number of persons were in peril of their lives while the squall lasted.

The high velocity at Idaho Falls occurred with the shift of the wind from south to southwest about 2 p. m. of the 13th. The daily weather maps do not show pressure gradients over Idaho that would probably cause such a wind.

The *resultant winds*, as deduced from the personal observations made at 8 a. m. and 8 p. m., are given in Table VIII. These latter resultants are also shown graphically on Chart IV, where the small figure attached to each arrow shows the number of hours that this resultant prevailed, on the assumption that each of the morning and evening observations represents one hour's duration of a uniform wind of average velocity. These figures indicate the relative extent to which winds from different directions counterbalanced each other.

ATMOSPHERIC ELECTRICITY.

Numerical statistics relative to auroras and thunderstorms are given in Table IX, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively.

Thunderstorms.—The dates on which the number of reports of thunderstorms for the whole country were most numerous were: 1st, 167; 2d, 119; 13th, 123; 16th, 259.

Reports were most numerous from Arizona and Ohio, 88; Colorado, 108; Florida, 121.

Thunderstorm days were most numerous in: Arizona, 27; Colorado, 25; Florida, 26; Utah, 23.

In Canada.—Thunderstorms were reported on the following dates: St. Johns, 1; Grand Manan, 9; Bermuda, 14; Yarmouth, 10, 27; Charlottetown, 14; Chatham, 10; Father Point, 9, 13; Quebec, 5, 9, 13; Montreal, 10, 13, 26; Toronto, 13; White River, 5, 15; Port Stanley, 1, 12, 16; Saugeen, 26; Port Arthur, 5, 6, 7; Winnipeg, 8; Minnedosa, 14, 27; Medicine Hat, 8, 14; Swift Current, 1, 28, 29; Prince Albert, 2; Battleford, 28.

Auroras.—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz, from the 6th to the 14th, inclusive. On the remaining twenty-one days of this month 38 reports were received, or an average of about 2 per day. The dates on which the number of reports of auroras for the whole country especially exceeded this average were: 1st, 4th, 11th, 4; 22d, 11.

Reports were most numerous from Illinois, 5; Montana, 6; North Dakota, 10.

The number of reports was a large percentage of the number of observers in: Delaware, 33; North Dakota, 17; Montana, 6.

In Canada.—Auroras were reported on the following dates: Father Point, 6, 15, 22, 23, 24; Quebec, 3, 4, 5, 11, 22, 28; White River, 23; Minnedosa, 2, 5, 10, 12, 19, 22, 23, 28, 29, 30; Qu'Appelle, 22; Medicine Hat, 6, 25; Banff, 9; Prince Albert, 10, 11; Battleford, 20, 22.

SUNSHINE AND CLOUDINESS.

The quantity of sunshine, and therefore of heat, received by the atmosphere as a whole is very nearly constant from year to year, but the proportion received by the surface of the earth depends upon the absorption by the atmosphere, and varies largely with the distribution of cloudiness. The sunshine is now recorded automatically at 21 regular stations of the Weather Bureau by its photographic, and at 41 by its thermal effects; at one of these stations records are kept by both methods. The photographic record sheets show the apparent solar time, but the thermometric records show seventy-fifth meridian time; for convenience the results are all given in Table X for each hour of local mean time. In order to complete the record of the duration of cloudiness these registers are supplemented by special personal observations of the state of the sky near the sun in the hours after sunrise and before sunset, and the cloudiness for these hours has been added as a correction to the instrumental records, whence there results a complete record of the duration of sunshine from sunrise to sunset.

The average cloudiness of the whole sky is determined by numerous personal observations at all stations during the daytime, and is given in the column "average cloudiness" in Table I; its complement, or percentage of clear sky, is given in the last column of Table X for the 61 stations at which instrumental self-registers are maintained.

COMPARISON OF DURATIONS AND AREAS.

The sunshine registers give the *durations* of effective sunshine whence the durations relative to possible sunshine are derived; the observers' personal estimates give the percentage of *area* of clear sky. These numbers have no necessary relation to each other, since stationary banks of clouds may obscure the sun without covering the sky, but when all clouds have a steady motion past the sun and are uniformly scattered over the sky, the percentages of duration and of area agree closely. For the sake of comparison, these percentages have been brought together, side by side, in the following table, from which it appears that, in general, the instrumental records of percentages of durations of sunshine are almost always larger than the observers' personal estimates of percentages of area of clear sky; the average excess for September, 1897, is 8 per cent for photographic and 7 per cent for thermometric records.

The details are shown in the accompanying table, in which the stations are arranged according to the *total possible* duration of sunshine, and not according to the *observed* duration. In obtaining the total possible sunshine the value for the parallel of latitude nearest the station is used.

Difference between instrumental and personal observations of sunshine.

Stations.	Latitude.		Apparatus.	For whole month.		Instrumental record of sunshine.			
				Total possible.	Personal.	Photographic.	Difference.	Thermometric.	Difference.
	°	′		*H'rs.*	%	%	%	%	%
Key West, Fla	24	34	T.	369.0	33	.....	.....	59	+26
Tampa, Fla	27	57	T.	369.6	46	.....	.....	48	+ 2
Galveston, Tex	29	18	P.	370.4	72	78	+ 6	.....	.....
New Orleans, La	29	58	T.	370.8	58	.....	.....	57	− 1
Savannah, Ga	32	05	P.	371.4	51	55	+ 4	.....	.....
Vicksburg, Miss	32	22	T.	371.4	73	.....	.....	77	+ 4
San Diego, Cal	32	43	P.	371.4	83	75	− 8	.....	.....
Charleston, S. C.	32	47	T.	371.4	54	.....	.....	58	+ 4
Phœnix, Ariz	33	28	P.	371.4	66	82	+16	.....	.....
Atlanta, Ga	33	45	T.	371.8	61	.....	.....	65	+ 4
Los Angeles, Cal	34	03	P.	371.8	65	78	+13	.....	.....
Wilmington, N. C.*	34	14	T.	.....	.....	.....	.....	.....	.....
Little Rock, Ark	34	45	T.	372.0	74	.....	.....	91	+17
Chattanooga, Tenn	35	04	T.	372.0	66	.....	.....	76	+10
Santa Fe, N. Mex	35	41	P.	372.2	49	63	+14	.....	.....
Raleigh, N. C.	35	45	T.	372.2	69	.....	.....	83	+14
Nashville, Tenn	36	10	T.	372.2	86	.....	.....	91	+ 5
Fresno, Cal	36	43	T.	372.6	85	.....	.....	91	+ 6
Dodge City, Kans	37	45	P.	373.0	73	86	+13	.....	.....
San Francisco, Cal	37	48	T.	373.0	63	.....	.....	71	+ 8
Louisville, Ky	38	15	T.	373.0	84	.....	.....	93	+ 9
St. Louis, Mo	38	38	T.	373.4	86	.....	.....	90	+ 4
Washington, D. C	38	54	P.	373.4	73	79	+ 6	.....	.....
Kansas City, Mo	39	05	P.	373.4	80	84	+ 4	.....	.....
Cincinnati, Ohio	39	06	T.	373.4	80	.....	.....	82	+ 2
Parkersburg, W. Va	39	16	T.	373.4	77	.....	.....	86	+ 9
Baltimore, Md	39	18	T.	373.4	77	.....	.....	74	− 3
Atlantic City, N. J	39	22	P.	373.4	67	80	+13	.....	.....
Denver, Colo	39	45	P.	373.6	47	69	+22	.....	.....
Indianapolis, Ind	39	46	T.	373.6	82	.....	.....	91	+ 9
Philadelphia, Pa	39	57	T.	373.6	62	.....	.....	77	+15
Columbus, Ohio	39	58	T.	373.6	76	.....	.....	90	+14
Harrisburg, Pa	40	16	T.	373.6	70	.....	.....	82	+12
Pittsburg, Pa	40	32	T.	374.0	58	.....	.....	51	− 7
New York, N. Y	40	43	T.	374.0	67	.....	.....	70	+ 3
Salt Lake City, Utah	40	46	P.	.....	55	.....	.....	.....	.....
Eureka, Cal	40	48	P.	374.0	50	48	− 2	.....	.....
Cheyenne, Wyo	41	08	P.	.....	58	.....	.....	.....	.....
Omaha, Nebr	41	16	P.	374.0	79	87	+ 8	.....	.....
Cleveland, Ohio	41	30	T.	374.5	64	.....	.....	73	+ 9
Des Moines, Iowa	41	35	T.	374.5	80	.....	.....	83	+ 3
Chicago, Ill	41	53	T.	374.5	71	.....	.....	71	0
Erie, Pa	42	07	T.	374.5	59	.....	.....	72	+13
Binghamton, N. Y	42	08	T.	374.5	61	.....	.....	67	+ 6
Detroit, Mich	42	20	T.	374.5	69	.....	.....	75	+ 6
Boston, Mass	42	21	T.	374.5	60	.....	.....	69	+ 9
Dubuque, Iowa*	42	30	T.	.....	.....	.....	.....	.....	.....
Albany, N. Y	42	39	T.	375.0	60	.....	.....	79	+19
Buffalo, N. Y	42	53	T.	375.0	56	.....	.....	67	+11
Rochester, N. Y	43	08	T.	375.0	52	.....	.....	54	+ 2
Idaho Falls, Idaho	43	29	T.	375.0	60	.....	.....	62	+ 2
Portland, Me	43	39	T.	375.4	58	.....	.....	75	+17
Northfield, Vt	44	10	P.	375.4	47	54	+ 7	.....	.....
Eastport, Me	44	54	P.	375.8	33	54	+21	.....	.....
St. Paul, Minn	44	58	P.	375.8	60	71	+11	.....	.....
Minneapolis, Minn	44	59	T.	375.8	.....	.....	.....	64	.....
Portland, Oreg	45	32	T.	376.1	51	.....	.....	45	− 6
	45	32	P.	376.1	51	43	− 7	.....	.....
Helena, Mont	46	34	P.	376.9	67	69	+ 2	.....	.....
Bismarck, N. Dak	46	47	P.	376.9	73	78	+ 5	.....	.....
Seattle, Wash	47	38	T.	377.5	44	.....	.....	40	− 4
Spokane, Wash	47	40	P.	377.5	50	.....	.....	56	+ 6

* Instrument out of order.

CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Division.

The following extracts relating to the general weather conditions in the several States and Territories are taken from the monthly reports of the respective sections of the Climate and Crop Service. The name of the section director is given after each summary.

Snowfall and rainfall are expressed in inches.

Alabama.—The mean temperature was 75.6°, or 0.7° above normal; the highest was 102°, at Goodwater and Jasper on the 17th, and the lowest, 33°, at Hamilton on the 21st. The average precipitation was 0.55, or 2.15 below normal; the greatest monthly amount, 2.12, occurred at Mobile, while no rain fell at several stations.—*F. P. Chaffee.*

Arizona.—The mean temperature was 75.8°, or 2.2° above normal; the highest was 110°, at Maricopa, Parker, and Texas Hill on the 21st, 22d, 23d, and 24th, and the lowest, 37°, at Williams on the 16th. The average precipitation was 2.40, or 1.20 above normal; the greatest monthly amount, 7.10, occurred at Natural Bridge; no rain fell at San Simon.—*W. T. Blythe.*

Arkansas.—The mean temperature was 76.7°, or 3.8° above normal; the highest was 108°, at Keesees Ferry on the 3d, and the lowest, 33°, at Witts Springs on the 19th and at Newport on the 22d. The average precipitation was 0.60, or 2.46 below normal; the greatest monthly amount, 2.87, occurred at Fort Smith; no rain fell at several stations in the eastern portion of the State. The month was the driest September on record.—*F. H. Clarke.*

California.—The mean temperature was 67.7°, or 2.1° below normal; the highest was 117°, at Salton on the 24th, and the lowest, 10°, at Sneddens Ranch, Ventura County, on the 12th. The average precipitation was 0.33, or 0.11 above normal; the greatest monthly amount, 2.50, occurred at Crescent City Lighthouse; no rain fell in the upper San Joaquin Valley and in portions of southern California.—*W. H. Hammon.*

Colorado.—The mean temperature was 61.1°, or 3.7° above normal; the highest was 101°, at Las Animas and Wray on the 1st, and the lowest, 22°, at Millbrook on the 28th. The average precipitation was 1.31, or 0.27 above normal; the greatest monthly amount, 5.80, occurred at Rico, and the least, trace, at Yuma.—*F. H. Brandenburg.*

Florida.—The mean temperature was 77.2°, or 1.1° below normal; the highest was 99°, at Huntington on the 2d, and the lowest, 46°, at De Funiak Springs on the 21st. The average precipitation was 10.71, or 3.00 above normal; the greatest monthly amount, 23.01, occurred at Sebastian, and the least, 1.94, at De Funiak Springs.—*A. J. Mitchell.*

Georgia.—The mean temperature was 73.8°, or 1.3° above normal; the highest was 101°, at Washington on the 15th, and the lowest, 37°, at Cedartown on the 24th. The average precipitation was 2.83, or 1.31 below normal; the greatest monthly amount, 11.94, occurred at Brunswick; no rain fell at Canton, Gillsville, Rome, and Griffin.—*J. B. Marbury.*

Idaho.—The mean temperature was 57.8°; the highest was 95°, at Payette on the 21st, and the lowest, 17°, at Swan Valley on the 9th. The average precipitation was 1.10; the greatest monthly amount, 2.85, oc-

curred at Fort Sherman, and the least, trace, at Rexburg.—*D. P. McCallum.*

Illinois.—The mean temperature was 71.3°, or 5.6° above normal; the highest was 103°, at Alexander on the 11th and 12th, and at Walnut on the 13th; the lowest was 27°, at Philo on the 21st. The average precipitation was 1.02, or 2.03 below normal; the greatest monthly amount, 3.43, occurred at Walnut, and the least, trace, at Carlinville and Hillsboro.—*C. E. Linney.*

Indiana.—The mean temperature was 69.8°, or 2.8° above normal; the highest was 103°, at Vincennes on the 13th, and the lowest, 24°, at Markle on the 20th. The average precipitation was 0.59, or 2.45 below normal, the greatest monthly amount, 1.86, occurred at Cambridge City, and the least, trace, at Valparaiso and Vevay.—*C. F. R. Wappenhans.*

Iowa.—The mean temperature was 70.9°, or 8.7° above normal; the highest was 106°, at Malvern on the 2d and 3d, and the lowest, 26°, at Britt on the 20th. The average precipitation was 2.04, or 1.40 below normal; the greatest monthly amount, 5.88, occurred at Grand Meadow; no rain fell at Lemars.—*G. M. Chappel.*

Kansas.—The mean temperature was 74.0°, or 4.9° above normal; the highest was 105°, at Girard and Oswego on the 5th, and the lowest, 36°, at Seneca on the 20th. The average precipitation was 1.35, or 0.73 below normal; the greatest monthly amount, 3.42, occurred at Gove, and the least, 0.05, at Oswego.—*T. B. Jennings.*

Kentucky.—The mean temperature was 72.8°, or 3.4° above normal; the highest was 105°, at Greensburg on the 14th and at Shelby City on the 15th, and the lowest, 31°, at Loretto and Pleasure Ridge Park on the 21st. The average precipitation was 0.21, or 2.73 below normal; the greatest monthly amount, 1.20, occurred at Scott; no rain fell at Paducah and Shelby City. The month was the driest September on record.—*Frank Burke.*

Louisiana.—The mean temperature was 77.2°, or 0.6° above normal; the highest was 102°, at Liberty Hill on the 4th, and the lowest, 36°, at Robeline on the 21st. The average precipitation was 2.17, or 0.70 below normal; the greatest monthly amount, 8.60, occurred at Port Eads, and least, trace, at Como and Oakridge.—*R. E. Kerkam.*

Maryland.—The mean temperature was 66.8°, or 0.4° below normal; the highest was 100°, at Taneytown on the 11th, and the lowest, 22°, at Deerpark on the 21st. The average precipitation was 1.88, or 1.72 below normal; the greatest monthly amount, 3.37, occurred at Sunnyside, and the least, 0.50, at Solomons.—*F. J. Walz.*

Michigan.—The mean temperature was 63.3°, or 3.4° above normal; the highest was 100°, at Mottville on the 9th, and the lowest, 20°, at Iron River on the 20th. The average precipitation was 1.30, or 1.54 below normal; the greatest monthly amount, 3.62, occurred at Sidnaw, and the least, 0.10, at Highland Station and Howell. The month was the driest September on record.—*C. F. Schneider.*

Minnesota.—The mean temperature was 65.2°, or 5.6° above normal; the highest was 99°, at Milan on the 7th, and the lowest, 18°, at Tower on the 20th. The average precipitation was 1.80, or 0.53 below normal; the greatest monthly amount, 6.50, occurred at Bonniwell, and the least, 0.20, at Koochiching.—*T. S. Outram.*

Mississippi.—The mean temperature was 76.9°, or 2.5° above normal; the highest was 100°, at University on the 16th, and the lowest, 36°, at French Camps on the 22d. The average precipitation was 0.65, or 3.16 below normal; the greatest monthly amount, 4.09, occurred at Biloxi. No rain fell over a considerable area in the northern portion of the State.—*R. J. Hyatt.*

Missouri.—The mean temperature was 74.2°, or 6.4° above normal; the highest was 105°, at Humansville and Mount Vernon on the 3d and at Elmira on the 4th; the lowest was 27°, at Potosi on the 21st. The average precipitation was 0.70, or 2.62 below normal; the greatest monthly amount, 2.70, occurred at Elmira; no rain fell at New Madrid. The month was remarkably dry and the warmest September for many years.—*A. E. Hackett.*

Nebraska.—The mean temperature was 70.6°, or 7.0° above normal; the highest was 113°, at Franklin on the 7th, and the lowest, 29°, at Kimball on the 16th. It was the warmest September during the past twenty-two years. The average precipitation was 1.26, or 0.58 below normal; the greatest monthly amount, 4.88, occurred at Arapahoe, and the least, trace, at Burwell and Fort Robinson.—*G. A. Loveland.*

New England.—The mean temperature was 59.4°, or 0.3° below normal; the highest was 98°, at Cumberland Mills, Me., on the 10th, and the lowest, 25°, at Grafton, N. H., on the 22d. The average precipitation was 2.19, or 1.07 below normal; the greatest monthly amount, 3.95, occurred at Block Island, R. I., and the least, 0.80, at Vineyard Haven, Mass.—*J. W. Smith.*

New Jersey.—The mean temperature was 65.5°, or 0.5° below normal; the highest was 99°, at Barnegat on the 11th, and the lowest, 30°, at Rivervale on the 28th. The average precipitation was 1.65, or 2.27 below normal; the greatest monthly amount, 3.97, occurred at Blairstown, and the least, 0.21, at Port Norris.—*E. W. McGann.*

New Mexico.—The mean temperature was slightly above normal; the highest was 95°, at Olio on the 1st, and the lowest, 26°, at Buckmans on the 28th. The average precipitation was slightly above normal; the greatest monthly amount, 5.38, occurred at Hillsboro, and the least, 0.11, at Raton.—*H. B. Hersey.*

New York.—The mean temperature was 60.9°, or 0.2° below normal; the highest was 97°, at Wedgewood on the 16th, and the lowest, 23°, at Franklinville on the 28th. The average precipitation was 1.92, or 1.39 below normal; the greatest monthly amount, 4.72, occurred at Ithaca, and the least, 0.29, at Lyndonville.—*R. M. Hardinge.*

North Carolina.—The mean temperature was 70.7°, or 0.5° above normal; the highest was 101°, at Chapel Hill and Tarboro on the 14th, and the lowest, 28°, at Linville on the 30th. The average precipitation was 1.47, or 3.07 below normal; the greatest monthly amount, 6.14, occurred at Southport, and the least, 0.19, at Waynesville.—*C. F. von Herrmann.*

North Dakota.—The mean temperature was 64.1°, or 7.4° above normal; the highest was 109°, at Whites Ranch on the 3d, and the lowest, 18°, at Gallatin on the 19th. The average precipitation was 0.28, or 0.87 below normal; the greatest monthly amount, 0.92, occurred at Whites Ranch; no rain fell at Grafton and Jamestown, and but a trace at Ellendale, Gallatin, Larimore, McKinney, Milton, and Sheyenne.—*B. H. Bronson.*

Ohio.—The mean temperature was 66.9°, or 2.1° above normal; the highest was 105°, at Logan on the 14th and 15th and at Jacksonboro on the 15th; the lowest was 25°, at Greenhill on the 28th. The average precipitation was 0.78, or 2.07 below normal; the greatest monthly amount, 2.04, occurred at Atwater, and the least, trace, at Greenfield. The month was remarkable as regards the great extremes of temperature both daily and for the month, the great number of absolutely clear and dry days, and the general and decided deficiency in total amount of moisture received.—*H. W. Richardson.*

Oklahoma.—The mean temperature was 74.9°; the highest was 108°, at Lehigh on the 4th, and the lowest, 36°, at Lehigh on the 22d. The average precipitation was 1.86; the greatest monthly amount, 8.10, occurred at Hennessey; no rain fell at Tulsa.—*J. I. Widmeyer.*

Oregon.—The mean temperature was 57.4°, or 1.0° below normal; the highest was 96°, at Grants Pass on the 25th, and the lowest, 20°, at Burns on the 30th. The average precipitation was 1.87, or 0.11 below normal; the greatest monthly amount, 5.41, occurred at Bay City, and the least, 0.14, at Riverside.—*B. S. Pague.*

Pennsylvania.—The mean temperature was 63.8°, or 1.0° above normal; the highest was 100°, at Hollidaysburg on the 16th, and the lowest, 24°, at Franklin on the 21st. The average precipitation was 2.18, or 1.39 below normal; the greatest monthly amount, 4.21, occurred at Lockhaven, and the least, 0.25, at Cannonsburg.—*T. F. Townsend.*

South Carolina.—The mean temperature was 73.3°, or 0.8° below normal; the highest was 100°, at Blackville, Central, and Columbia on the 15th, and the lowest, 42°, at Holland on the 30th, and at Walhalla on the 29th. The average precipitation was 2.91, or 2.03 below normal; the greatest monthly amount, 5.52, occurred at St. Matthews, and the least, 0.80, at Walhalla.—*J. W. Bauer.*

South Dakota.—The mean temperature was 68.9°, or 8.5° above normal; the highest was 107°, at Cherry Creek on the 7th, and the lowest, 25°, at Cross on the 16th, and at Castlewood, Goudyville, and Watertown on the 17th. The average precipitation was 1.09, or 0.23 below normal; the greatest monthly amount, 3.57, occurred at Howard; no rain fell at Farmingdale, Forest City, and Spearfish.—*S. W. Glenn.*

Tennessee.—The mean temperature was 72.3°, or 2.4° above normal; the highest was 104°, at Sylvia on the 11th, and the lowest, 30°, at Erasmus, Hohenwald, and Johnsonville on the 22d. The average precipitation was 0.55, or 2.45 below normal; the greatest monthly amount, 3.19, occurred at Newmarket, while at many stations in the western half of the State no rain fell.—*H. C. Bate.*

Texas.—The mean temperature for the State during the month was 0.4° below the normal. There was a general deficiency throughout the State, except over north and central Texas, the western portion of southwest Texas, and the northern portion of east Texas, where there was an excess ranging from 0.1° to 2.5°, with the greatest excess in the vicinity of Corsicana. The deficiency ranged from 0.3° to 3.2° over the panhandle, over west Texas, over the eastern portion of southwest Texas, and the southern portion of east Texas, and from 0.4° to 3.4° over the coast district, with the greatest deficiency in the vicinity of Fort Ringgold. The highest was 105°, at Texarkana on the 3d, and the lowest, 40°, at Kerrville on the 26th and at Texarkana on the 23d. The average precipitation for the State during the month was 1.18 below the normal. There was a general deficiency, except over the greater portion of central Texas, over the western portions of north and west Texas, and in the vicinity of Huntsville and Houston, where there was an excess ranging from 0.23 to 2.29, with the greatest in the vicinity of Burnet. The deficiency ranged from 0.03 to 2.58 over the panhandle and the eastern portions of north and west Texas, from 0.07 to 3.35 over east and southwest Texas, and from 0.48 to 4.62 over the coast district, with the greatest deficit in the vicinity of Corpus Christi. The greatest monthly amount, 5.25, occurred at Conroe, and the least, 0.10, at Point Isabel.—*I. M. Cline.*

Utah.—The mean temperature was 62.2°; the highest was 100°, at Fillmore and St. George on the 1st, and the lowest, 25°, at Loa on the 13th. The average precipitation was 1.64; the greatest monthly amount, 4.61, occurred at Fort Du Chesne, and the least, 0.17, at Huntsville.—*J. H. Smith.*

Virginia.—The mean temperature was 68.8°, or 1.0° above normal; the highest was 102°, at Nottoway on the 10th, and the lowest, 26°, at Goshen on the 22d. The average precipitation was 1.01, or 3.46 below normal; the greatest monthly amount, 2.56, occurred at Salem, and the least, trace, at Farmville.—*E. A. Evans.*

Washington.—The mean temperature was 56.9°, or 0.3° below normal; the highest was 97°, at Centerville on the 21st, and the lowest, 24°, at Wenatchee Lake on the 28th. The average precipitation was 1.79, or 0.22 below normal; the greatest monthly amount, 7.90, occurred at Snohomish, and the least, 0.11, at Lakeside.—*G. N. Salisbury.*

West Virginia.—The mean temperature was 66.4°, or slightly above normal; the highest was 103°, at Hewett on the 15th and 16th, and the lowest, 27°, at White Sulphur Springs on the 17th. The average precipitation was 1.14, or greatly below normal; the greatest monthly amount, 4.00, occurred at Philippi, and the least, 0.02, at Green Sulphur Springs.—*H. L. Ball.*

Wisconsin.—The mean temperature was 65.5°, or 4.5° above normal; the highest was 97°, at Chilton, Sharon, and Whitemound on the 8th and at Delavan on the 10th, and the lowest, 22°, at Antigo and Barron on the 20th. The average precipitation was 2.28, or 0.78 below normal; the greatest monthly amount, 6.58, occurred at Prairie du Chien, and the least, 0.72, at Port Washington.—*W. M. Wilson.*

Wyoming.—The mean temperature was 61.1°, or 4.0° above normal; the highest was 99°, at Carbon on the 2d and at Fort Laramie on the 8th, and the lowest, 21°, at Fort Washakie on the 18th. The average precipitation was 0.38, or 0.67 below normal; the greatest monthly amount, 1.14, occurred at Fort Laramie, and the least, trace, at Wheatland.—*M. G. Renoe.*

RIVER AND FLOOD SERVICE.

By PARK MORRILL, Forecast Official, in charge of River and Flood Service.

The rivers have continued falling slowly and are now at about their annual ebb. As a rule, they are below their normal of lowest stage. Navigation is practically suspended except on the Mississippi below Cairo.

The highest and lowest water, mean stage, and monthly range at 113 river stations are given in the accompanying table. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are: Keokuk, St. Louis, Cairo, Memphis, and Vicksburg, on the Mississippi; Cincinnati, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.

The following résumé of river stages and conditions of navigation in the respective streams is compiled from reports by the officials of the Weather Bureau at various river stations and section centers:

Atlantic Coast Rivers. (Reported by A. F. Sims, Albany, N. Y.; E. R. Demain, Harrisburg, Pa.; E. A. Evans, Richmond, Va.; C. F. von Herrmann, Raleigh, N. C.; L. N. Jesunofsky, Charleston, S. C.; D. Fisher, Augusta, Ga.; and J. B. Marbury, Atlanta, Ga.)—During the first decade of September an abnormally low stage of water was maintained in the Hudson River. The water reached the lowest point for the season on the 7th. Usually the water is lowest in the months of July and August. The water has been so low that the steamer *Saratoga* of the Citizens' Line brought up mud on her huge paddles at every revolution. Light fog prevailed in the Hudson Valley on the 9th, and a dense fog on the 6th, and during the early morning hours on the 22d.

About the usual stages of water for the time of year obtained in the Susquehanna River and its tributaries. The average gauge readings of 14 reporting stations was 0.6 foot, the same as in 1896, although the average rainfall for 17 stations was only about 70 per cent of the amount registered during September, 1896. In the lower river, while low stages prevailed, the water did not fall so low as in last September. The average for the month at Harrisburg was 0.5 foot higher than during the corresponding period in 1896. Drought prevailed during the first half of the month and all streams fell slowly, but showers occurred in the basin from the 16th to the 22d and a general rain fell on the 23d and 24th, causing a rise of from 1 to 2 feet at most reporting stations, and the month closed with higher stages than ruled at the beginning of the month.

On the West Branch, at Sinnamahoning and Cedar Run, the water was below zero of the gauge during the entire month; at Cameron it ranged from —0.2 to 0.2; at Renovo the range was from zero to —0.5 from the 1st to the 24th, the river rising to a maximum of 2 feet on the 26th; at Lockhaven the water stood at zero from the 10th to the 19th, inclusive, and touched zero again on the 23d, the maximum reading for the month being 1 foot on the 26th; at other stations on the West Branch the gauge readings ranged from zero to 2.8 feet above. On the North Branch, at Wilkesbarre, the gauge readings ranged from zero to 1 foot below, and at East Bloomsburg a zero stage was maintained from the 1st to the 23d, when the river began to rise, the highest point touched being 2.5 feet on the 26th and 27th. The Juniata kept up well notwithstanding the deficiency in rainfall, the gauge readings ranging from 1.5 to 3.8 feet.

An unusually low stage of water prevailed in the James River, from the head of tidewater to its source, during the entire month. The month was largely deficient in rainfall, none of any consequence being reported, except about the 1st and 21st to 23d, when fairly good showers fell over the river basin. The proportion of this downfall which drained to the river was very small, owing to the dry condition of the ground, and hence but a slight passing change in the stage of the water occurred.

At Richmond the falls of the James present an unusual sight, the river bed being entirely uncovered in some places, and rocks never known before to be above the surface, are now high and dry. The water is the lowest on record at this point, and from reliable sources it is learned that it is lower than for many years, if not the lowest observed. The officials of the Chesapeake and Ohio Railway Company, which has maintained a system of gauges on the James River division of their line, state that the present stage of water is the lowest of which they have any record. This same state of affairs obtains in all the large streams in this portion of the State. The Rappahannock River is so low that the mills have been obliged to shut down, and on the line of the Richmond and Danville Railroad water has to be hauled from Richmond in tank cars to various points for use of the engines. Small creeks and branches, which are reported to have always furnished water heretofore, are now dry. The question of water is becoming a serious one for the agricultural communities of this section.

The month of September was characterized by the most severe drought in the history of North Carolina. The small amounts of precipitation occurring between the 17th and 23d were altogether insufficient to appreciably influence the stages of the rivers. The latter remained exceptionally low the entire month. During the second decade the lowest stages ever recorded were noted on the Cape Fear and Roanoke. On the Dan, at Clarksville, the river was 0.4 foot below the zero of the gauge from the 13th to the 17th, and at Fayetteville the Cape Fear diminished to 0.3 foot on the 17th. Many of the small streams in the upper country have become quite dry; wells are very low and many dry; stock has to be watered; navigation, except near the mouths of the Roanoke and Cape Fear, has been completely interrupted.

The freshet on the lower Edisto, at Jacksonboro, on September 27, continued to the 4th of October, when the water had receded sufficiently for the proper drainage of the rice lands. Much of the rice was overripe when the flood waters arrived, but by rapid harvesting, immediately after the freshet subsided, considerable was saved. The damage caused by the freshet was not so great as at first anticipated. A few of the rice planters escaped the high water entirely, as their crops were gathered two days before the rise occurred.

The general and heavy precipitation on the 21st and 22d affected the streams but slightly; other than this but little rainfall occurred over the drainage areas of the upper sections of the streams. The Great Pedee, from its mouth at Winyah Bay to Cheraw, was scarcely navigable during any day in the month. At Smiths Mills the gauge registered —1.6 foot on the 16th, 17th, and 18th, which was below the low water reading of October 22, 1895 (—0.4 foot). The latter was recorded at that time as being the lowest stage reached in thirty-eight years. Old river men connected with the steamboat interests for the past forty years state that they have never known the Great Pedee to become unnavigable for one entire month. This condition of affairs is rather unfortunate for the steamboat lines, as much cotton, rice, tar, rosin, turpentine, and other articles of merchandise, is awaiting transportation up and down these streams. There was also an unusual lack of steamboat water in the Little Pedee and Lumber rivers, navigation thereon having been impeded the entire month. The Waccamaw was at a fairly good stage up to Conway throughout the entire month, the traffic occasioned thereby having been quite brisk.

The Savannah fell to such a low stage during the first and second decades of the month that, for the greater portion of this period, navigation was wholly interrupted, several attempts having been made to run cargoes down the river, but even with the lightest of loads nothing was accomplished. The only rainfall worthy of note during September was that which occurred on the 22d and 23d, and though the fall was excessive over the central and lower portion of the Savannah

Valley, the amount of rainfall grew perceptibly smaller in advancing toward the upper basin; however, after the 22d regular schedules were resumed for the next five days, but after this further trouble was encountered and the boats were laid up again for want of sufficient water. But what was a serious loss to the boating interests proved to be a positive gain to the farmers in the lowlands, as one of the largest corn crops ever grown on these lands was harvested.

The month of September was abnormally dry, and little rain has fallen in the other drainage basins of Georgia, and as a consequence very low water has continued in the rivers during the month.

Mobile River and branches. (Reported by F. P. Chaffee, Montgomery, Ala., and W. M. Dudley, Mobile, Ala.)—Fairly good rains fell over the central portions of the watershed of the Alabama River during the middle of the month, but not enough to cause more than a very slight check in the fall of the rivers of this system, which have been either stationary or falling slowly during the entire month, at the close of which the lowest water of this season is noted. At Selma the stage was 2.0 feet below zero of gauge at the end of month, which is 0.1 foot lower than the lowest of last season. At other stations on the Alabama the stage is not quite as low as at the same season last year, but low enough to suspend steamboat traffic, except in the lower portions of the river.

The Tombigbee and its tributaries have been at very low stages during the entire month. There has been but little rain; that which occurred on the 13th and 14th was so light and of such short duration that it ran off rapidly. Owing to this lack of rainfall the fluctuations in the rivers have been very slight. The changes during the month have been downward; while the Tombigbee has been below the zero of the gauges during the entire month, the Warrior has been so since the 15th. There was some traffic on the Tombigbee and Alabama to the 13th, when the quarantine regulations stopped it, but it was resumed again toward the latter part of the month on authority of the State health officer, and boats were still running at the close of the month.

Ohio River and branches. (Reported by F. Ridgway, Pittsburg, Pa.; H. L. Ball, Parkersburg, W. Va.; S. S. Bassler, Cincinnati, Ohio; F. Burke, Louisville, Ky.; P. H. Smyth, Cairo, Ill.; L. M. Pindell, Chattanooga, Tenn.; and H. C. Bate, Nashville, Tenn.)—Navigation on the upper Ohio River has been suspended during the entire month, on account of low stages of water. The passenger and freight business of the packet lines plying the slack water of the lower Monongahela has been fair during the month.

The rainfall over West Virginia during the month of September was unusually light, and at no place did the amount reach the normal. A great many creeks and small tributaries were almost entirely dry by the end of the month and the rivers in the State were constantly at a low stage. Rains on the 21st and 24th resulted in a slight rise in the Ohio at Parkersburg, but no navigable stage of water was reached. Repairs on the locks along the Little Kanawha River were completed on the 16th, but the low stage would only allow the passage of one small packet, which made regular trips between Parkersburg and Palestine, a distance of 32 miles. Navigation on the Great Kanawha was open to the smaller packets.

A remarkable feature of the river at Cincinnati during the month of September was that there was not the slightest fluctuation in the stage, but a continuous and steady decline from the beginning to the end of the month, varied only by several short periods when it was at a stationary stage. The range for the month was 3.9 feet; the highest stage, 7.1, on the 1st, and the lowest, 3.2, from the 28th to the 30th.

The month opened with midsummer quiet on the river. Early morning fogs and menacing sandbars and snags made hazardous what little navigation there still was. The larger boats sought the banks and craft of lightest draught only were in service. Although freight offerings and passenger inquiries were more numerous than heretofore at this season of the year, the low and steadily declining stages of water prevented business on the river.

The water along shore is greenish and stagnant, an indication, according to old river men, of a long dry spell, which in this instance, at all events, has proved correct. Alarming reports were general concerning the continued drought and the dearth of water. At Ashland, Ky., wells dried up, and at Falmouth, Ky., the Licking River was dry, except for occasional stagnant pools. Pilots have been making trips in yawls to study and examine the condition of the river bed. Navigation is stopped to all up-river points, and only the lightest draught boats are running down stream.

At Louisville and Cairo the river fell steadily throughout the month. The stage of 3.7 feet at Cairo on the last day of the month is the lowest the river has been at this point since November, 1895.

The rainfall over the Tennessee system during the month was exceedingly light, and below the normal; the greatest amount, 2.07 inches, fell at Bluff City on the Holston River. No rain fell at Florence and Riverton. Navigation was closed to all boats during the month. The river was below the zero of the gauge from September 5 to 30 at Speers Ferry and Riverton, and from the 16th to 30th at Florence; at Kingston the river reached zero on the 11th and remained stationary during the rest of the month. The greatest change in the river at any station was a rise of 0.6 foot on the 5th at Clinton.

August closed with the Cumberland River low and falling steadily, and navigation closed above Nashville. Two feet is about the lowest stage that loaded boats can navigate the lower river, and the last boat left Nashville on the 4th for Paducah. The river rose slightly on the 17th, and on the next day a light boat left for the lower river to load and return with the first favorable stage of water. The month closed with the river very low and falling at all points.

Mississippi River and branches, except the Ohio. (Reported by P. F. Lyons, St. Paul, Minn.; M. J. Wright, Jr., La Crosse, Wis.; G. E. Hunt, Davenport, Iowa; F. Z. Gosewisch, Keokuk, Iowa; H. C. Frankenfield, St. Louis, Mo.; P. H. Smyth, Cairo, Ill.; S. C. Emery, Memphis, Tenn.; R. J. Hyatt, Vicksburg, Miss.; R. E. Kerkam, New Orleans, La.; P. Connor, Kansas City, Mo.; F. H. Clarke, Little Rock, Ark.; J. J. O'Donnell, Fort Smith, Ark.; and C. Davis, Shreveport, La.)—The extreme gauge readings for the Mississippi River at St. Paul during September were 4.5 and 5.5 feet. That is decidedly a better stage of water than can be shown for any other September since that of 1881, and with conditions such as have been usual since then, it would be considered very satisfactory; but the floods of last spring seem to have caused deposits in the bed of the river, and changes in the channel, and hence navigation has been impaired even with these favorable water stages. The steamer *Dubuque*, of the Diamond Jo Line, left on the 10th, for St. Louis, and with her departure came the close of navigation so far as regular freight and passenger traffic is concerned.

The comparatively steady and good stages of water noted must be partly due to the Government reservoirs at the headwaters of the Mississippi River, for the purpose of storing the surplus waters of spring. The rainfall of September, 1897, was considerably less than half the normal, and there was absolutely no rain during the last half of the month, and yet the river changed but little.

Good navigation was maintained at La Crosse during the month. The average stage of water at this point for the month was 4.0 feet, which is about 2.5 feet higher than the average for September, 1896. The month opened with a stage of 4.2 feet on the gauge and gradually declined until the 10th instant, when it reached a minimum stage of 3.4 feet. The river was stationary at the maximum stage of 4.3 feet for three days during the last decade of the month.

The stage of water at the various stations fluctuated in response to local rains, but these minor changes were of short duration. From La Crosse to Muscatine the river was a little lower, a fall of 0.7 foot at the last-named place, being the greatest monthly change. There has not been enough water for the larger steamboats, but the smaller local packets have experienced no trouble. Some rafting is still going on.

The tendency of the river at Keokuk has been to decline slowly during the month, and it is 0.9 foot lower at the close of the month than at the beginning. Still it is not low enough to interfere materially with the navigation of the regular channels, by light draught steamboats, except on the Des Moines rapids, which have not been navigable.

The rivers in the St. Louis district continued to fall during the month of September, reaching so low a stage about the middle of the month that navigation was totally suspended on the Missouri River, and was possible only for light draught boats on the Mississippi and Illinois rivers.

From St. Louis to Cairo the river fell slowly during most of the month. The low stage of the river is proving decidedly dangerous for navigation, several disasters having occurred during the month. The Anchor Line steamer *Belle Memphis*, estimated to have been worth between $50,000 and $60,000, was sunk just below Chester, Ill., on the 8th instant. She is supposed to have struck a sunken snag, which ripped through her bottom, and is reported a total wreck. On the 16th instant the Anchor Line steamer *Bluff City*, in backing off a reef near Avenue, Tenn., ran against the bank and demolished her wheel. On the 23d the Government steamer *Minnetonka*, a tender for the dredge boat fleet at work on the river below Cairo, struck what was supposed to be a sunken snag near Golddust, Tenn. No definite information could be obtained as to the extent of the damage, but it is reported to have been slight.

The month opened with a fair stage of water in the Mississippi from Cairo to Helena, but a steady fall continued up to the 28th, when it became stationary at 1.6 foot at Memphis, the total fall for the month being 4.1 feet. The average for the month was 4 feet below the normal September stage. It is estimated that there was only 5 feet of water from Cairo to Memphis at the close of the month, and most of the tributaries were so low that only the smallest boats could be operated.

The rivers between Memphis and Vicksburg were very low, and continued to fall during the month, as a rule. No precipitation of importance was reported, the only measurable amount being at Vicksburg, where 0.28 of an inch was recorded. Navigation was seriously interrupted not only by low water, but by stringent quarantine regulations, which forbade local traffic, owing to the prevalence of yellow fever in this section. Some few boats continued to run on the Mississippi between non-infected points in consequence of the restricted business. River interests have suffered considerably by the loss of trade, as a great deal of cotton is now ready for shipment.

The Mississippi, below Vicksburg, continued to decline gradually to the close of the month, except that at and below New Orleans the stage fluctuated, high winds on several occasions backing up the water

from the Gulf. The most marked occurrence of the sort was during the last three days of the month. The range of fluctuation did not exceed 2 feet at New Orleans during the entire month, while at Vicksburg the fall was 7 feet. Quarantine regulations in force during two-thirds of the month (from the 10th to the close) made all river traffic light, many places along the lower river refusing to allow steamboats from New Orleans to land.

The Arkansas River has maintained a very low stage throughout the month, being lower at Little Rock at the end of the month than it has been since December, 1887. The river declined slowly during the month, with only two slight rises, from the 11th to the 13th and from the 16th to the 17th. The range in depth of water was remarkably slight, being but 1.3 foot at Fort Smith, 1.7 foot at Dardanelle, and 1.9 foot at Little Rock. The river was too low for profitable navigation between Little Rock and Dardanelle during the entire month, none but the smallest steamboats being able to run. A navigable stage was maintained, however, from Pinebluff to the mouth.

Little rain fell during the month in the watershed of the Red River, and, as a result, the stream was characterized by very low stages. The upper Red had readings only a few feet above the zero of gauge, while at Shreveport stages below zero were recorded after the 7th. These conditions, together with the rigid quarantine rules in force, necessitated an entire suspension of navigation.

Rivers on the Pacific Coast. (Reported by W. H. Hammon, San Francisco, Cal.; J. A. Barwick, Sacramento, Cal.; and B. S. Pague, Portland, Oreg.)—The rivers have generally fallen slowly during the month. The Sacramento River at Sacramento ranged during the month of September between 8.7 and 8.3 feet, and has about reached its annual lowest point, unless the autumn rains hold off longer than usual, and in that case the river may fall several inches lower. Navigation was some time since obstructed by a sand bar forming about 2 miles below this city; before the commencement of building wing dams to increase the river's depth over the sand bar, the current of the stream, through some unknown cause, cut the sand away, and navigation is now and has been for the past three weeks unobstructed between this city and the mouth of the Sacramento River. Navigation above this city has also been good for the class of steamers that ply on that portion of the river between this city and the head of navigation, which for all practical purposes is Redbluff.

Navigation on the Columbia and Willamette was more difficult than usual, owing to the low stage of the water. During the month many large vessels come into Portland to load grain for England. They carry from 100,000 to 150,000 bushels of wheat each and go down the Willamette and Columbia rivers, drawing up to 23 feet of water. The *Glenlochy*, one of the largest steamships afloat, loaded with over 3,000,000 feet of lumber, left this port for Siberia. These items are given to show that a low stage of water in the river does not impede navigation to the sea.

Heights of rivers above zeros of gauges, September, 1897.

Stations.	Distance to mouth of river.	Danger line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Mississippi River.	*Miles*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
St. Paul, Minn.	1,957	14	5.5	17-19	4.5	1,2	4.9	1.0
Reeds Landing, Minn.	1,887	12	3.4	22,23	2.5	8,9	3.0	0.9
La Crosse, Wis.	1,822	10	4.3	24-26	3.4	10	4.0	0.9
North McGregor, Iowa	1,762	18	4.1	2	2.9	12	3.5	1.2
Dubuque, Iowa	1,702	15	4.7	2	2.9	13-15	3.5	1.8
Leclaire, Iowa	1,612	10	2.9	3-5	1.7	15-17	2.1	1.2
Davenport, Iowa	1,596	15	4.0	4	2.6	15-17	3.1	1.4
Keokuk, Iowa	1,466	14	3.0	6	1.6	30	2.2	1.4
Hannibal, Mo	1,405	17	3.8	1,7,8	2.5	19,30	3.1	1.3
Grafton, Ill	1,307	23	5.0	1	3.3	22	4.0	1.7
St. Louis, Mo.	1,264	30	6.8	1	3.9	22,23	4.9	2.9
Chester, Ill.	1,189	30	5.0	1	2.5	23,24	3.4	2.5
Cairo, Ill	1,073	40	9.0	1,2	3.7	30	5.6	5.3
Memphis, Tenn	843	33	5.7	1	1.6	27-30	3.2	4.1
Helena, Ark	767	44	8.6	1	1.2	30	4.4	7.4
Arkansas City, Ark.	635	42	8.9	1	0.1	30	3.9	8.8
Greenville, Miss	595	40	7.4	1	0.9	30	3.9	6.5
Vicksburg, Miss	474	41	8.6	1	1.0	30	4.5	7.6
New Orleans, La	108	16	6.0	12	2.5	25	3.8	3.5
Arkansas River.								
Fort Smith, Ark.	345	22	2.4	1	1.1	26-30	1.5	1.3
Dardanelle, Ark.	250	21	1.6	1	— 0.1	24,25; 28-30	0.3	1.7
Little Rock, Ark.	170	23	3.9	1	2.0	29,30	2.7	1.9
White River.								
Newport, Ark	150	22	0.9	1	0.2	25-30	0.5	0.7
Des Moines River.								
Des Moines, Iowa.	150	19	3.7	1	3.0	28-30	3.4	0.7
Illinois River.								
Peoria, Ill.	135	14	3.9	1-15; 17-25	3.7	29,30	3.9	0.2
Missouri River.								
Bismarck, N. Dak.	1,201	14	2.6	1	2.0	19-30	2.2	0.6
Pierre, S. Dak.	1,006	14	2.3	1	0.9	24-30	1.4	1.4
Sioux City, Iowa	676	19	7.0	1-6	5.3	30	6.2	1.7
Omaha, Nebr.	561	18	6.5	1,2	5.0	29,30	5.7	1.5
St. Joseph, Mo.	373	10	2.1	1	0.3	30	1.1	1.8
Kansas City, Mo.	280	21	6.8	1,2	5.0	18,20,22	5.5	1.8
Boonville, Mo.	191	20	7.5	1	4.7	30	6.1	2.8
Hermann, Mo.	95	21	1.6	1	— 0.8	30	0.1	2.4

Heights of rivers above zeros of gauges—Continued.

Stations.	Distance to mouth of river.	Danger line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Ohio River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Pittsburg, Pa	966	22	6.5	26	5.2	12	5.7	1.3
Davis Island Dam, Pa.	960	25	3.0	26	1.5	16-20	2.1	1.5
Wheeling, W. Va.	875	36	3.0	1	0.9	19	1.8	2.1
Parkersburg, W. Va.	785	35	3.6	1-3	1.4	21-23,29	2.3	2.2
Point Pleasant, W. Va.	703	36	2.6	1	0.8	23-29	1.5	1.8
Catlettsburg, Ky	651	50	3.4	1	0.9	29,30	1.9	2.5
Portsmouth, Ohio	612	50	5.0	1	1.9	25-29	3.0	3.1
Cincinnati, Ohio.	499	45	7.1	1	3.2	28-30	4.8	3.9
Louisville, Ky.	367	24	4.3	1	2.4	22-25	3.0	1.9
Evansville, Ind	184	30	6.1	1	1.0	30	2.9	5.1
Paducah, Ky.	47	40	3.7	1,2	0.2	30	1.6	3.5
Alleghany River.								
Warren, Pa.	177	7	0.3	1-7	0.0	18-30	0.1	0.3
Oil City, Pa	123	13	0.7	1	0.2	23-27	0.4	0.5
Parkers Landing, Pa.	73	20	1.3	2	0.2	23-30	0.5	1.1
Freeport, Pa.	26	20	1.6	1,3,6	0.7	15,16,18	1.1	0.9
Conemaugh River.								
Johnstown, Pa.	64	7	2.2	25	0.6	10-12,16	1.0	1.6
Red Bank Creek.								
Brookville, Pa.	35	8	— 0.1	25-27	— 0.6	5-23	—0.5	0.5
Beaver River.								
Ellwood Junction, Pa.	10	14	— 0.1	2-4,7	— 0.5	29,30	—0.3	0.4
Cumberland River.								
Burnside, Ky	434	50	0.8	1,2	— 0.7	28-30	—0.1	1.5
Carthage, Tenn	257	30	1.7	1	0.2	30	0.1	1.5
Nashville, Tenn	175	40	2.7	1	0.5	28-30	1.4	2.2
Great Kanawha River.								
Charleston, W. Va.	61	30	6.2	28	4.5	21	4.8	1.7
New River.								
Hinton, W. Va.	95	14	1.3	26	0.8	20-24	1.0	0.5
Licking River.								
Falmouth, Ky.	30	25	1.0	1-4	0.4	20-30	0.6	0.6
Miami River.								
Dayton, Ohio	69	18	1.6	16	0.8	28-30	1.1	0.8
Monongahela River.								
Weston, W. Va	161	18	0.7	4	— 2.1	29,30	—1.4	2.8
Fairmont, W. Va	119	25	0.0	1	— 0.7	13-21	—0.6	0.7
Greensboro, Pa.	81	18	7.3	1	5.8	29,30	6.4	1.5
Lock No. 4, Pa.	40	28	7.6	1-3	4.8	19	6.4	2.8
Cheat River.								
Rowlesburg, W. Va.	36	14	4.2	17	— 0.7	17	1.1	4.9
Youghiogheny River.								
Confluence, Pa.	59	10	0.5	24,25	— 0.1	14-23	0.1	0.6
West Newton, Pa.	15	25	0.6	27	— 0.1	16-20; 24-26	0.0	0.7
Muskingum River.								
Zanesville, Ohio	70	20	5.5	2,3	4.8	30	5.2	0.7
Tennessee River.								
Knoxville, Tenn.	614	29	1.3	1	0.2	30	0.8	1.1
Kingston, Tenn	534	25	0.5	1,2	0.0	11-30	0.1	0.5
Chattanooga, Tenn.	430	33	2.2	2	0.7	27-30	1.2	1.5
Bridgeport, Ala	390	24	0.8	1-3	0.0	24-30	0.3	0.8
Florence, Ala	220	16	0.9	1	— 0.3	22-29	0.1	1.2
Johnsonville, Tenn.	94	21	2.0	1	— 0.1	26-30	0.6	2.1
Clinch River.								
Speers Ferry, Va.	156	20	0.2	2	— 0.7	22,26,28	—0.4	0.9
Clinton, Tenn	46	25	4.2	6	2.0	28-30	2.9	2.2
Wabash River.								
Mount Carmel, Ill.	50	15	1.2	1	0.7	25-30	0.9	0.5
Red River.								
Arthur City, Tex.	688	27	5.6	25	3.3	7-9	4.2	2.3
Fulton, Ark	565	28	2.9	2	2.2	7-13; 26-29	2.5	0.7
Shreveport, La.	449	29	0.6	1	— 0.8	24-27	—0.4	1.4
Alexandria, La	139	33	— 0.6	1-3	— 2.3	30	—1.7	1.7
Atchafalaya Bayou.								
Melville, La	100*	31	9.2	1	2.4	28-30	5.3	6.8
Ouachita River.								
Camden, Ark.	340	39	3.2	1,2	2.5	22-30	2.7	0.7
Monroe, La	100	40	0.8	1	0.0	24-30	0.3	0.8
Yazoo River.								
Yazoo City, Miss.	80	25	— 1.0	1	— 2.6	25,29,30	—2.1	1.6
Chattahoochee River.								
Columbus, Ga.	140	20	0.9	10,11	— 0.9	19	0.1	1.8
Flint River.								
Albany, Ga.	80	20	2.2	1,4	1.1	27-29	1.6	1.1
Cape Fear River.								
Fayetteville, N. C.	100	38	4.6	2	0.3	17	1.4	4.3
Columbia River.								
Umatilla, Oreg	270	16	7.7	1	2.4	30	5.0	5.3
The Dalles, Oreg.	166	40	11.5	1	4.5	30	7.5	7.0
Willamette River.								
Albany, Oreg	99	20	1.5	5-9	1.0	1,22-30	1.2	0.5
Portland, Oreg	10	15	5.9	1	1.6	20	3.5	4.3
Edisto River.								
Edisto, S. C	75	6	5.0	1,26-28	2.1	21	3.6	2.9
James River.								
Lynchburg, Va.	257	18	0.3	1	— 0.2	9-22; 27-30	—0.1	0.5
Richmond, Va.	110	12	0.4	4	— 0.4	8,9	—0.2	0.8
Alabama River.								
Montgomery, Ala.	265	35	0.7	1,2	— 1.3	28-30	—0.5	2.0
Selma, Ala.	212	35	0.6	1	— 2.0	28-30	—0.9	2.6
Coosa River.								
Gadsden, Ala	144	18	— 0.2	1-11	— 0.7	24-30	—0.4	0.5
Tombigbee River.								
Columbus, Miss.	285	33	— 2.4	1	— 3.5	22-25; 28-30	—3.1	1.1
Demopolis, Ala.	155	35	— 1.3	1	— 2.4	29,30	—2.1	1.1
Black Warrior River.								
Tuscaloosa, Ala.	90	38	1.0	2,3	— 1.5	29,30	—0.2	2.5
Pedee River.								
Cheraw, S. C.	145	27	1.7	1,4	0.4	17	0.9	1.3

Heights of rivers above zeros of gauges—Continued.

Stations.	Distance to mouth of river.	Danger line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Black River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Kingstree, S. C.	60	12	7.4	2	1.2	22-28	3.3	6.2
Lumber River.								
Fairbluff, N. C.	10	6	2.5	1	— 0.4	15-19	0.1	2.9
Lynch Creek.								
Effingham, S. C.	35	12	4.3	28	2.2	18	2.9	2.1
Potomac River.								
Harpers Ferry, W. Va.	170	16	0.7	1	0.0	7-19; 21-24	0.2	0.7
Roanoke River.								
Clarksville, Va.	155	12	0.4	27	— 0.4	13-17, 21	—0.1	0.8
Sacramento River.								
Redbluff, Cal.	241	23	0.7	2	0.0	18-30	0.1	0.7
Sacramento, Cal.	70	25	8.7	1-11	8.3	26-30	8.5	0.4
Santee River.								
St. Stephens, S. C.	50	12	5.1	27	— 1.4	18-22	1.0	6.5
Congaree River.								
Columbia, S. C.	37	15	2.0	23, 24	1.5	1-22; 25-30	1.5	0.5

Heights of rivers above zeros of gauges—Continued.

Stations.	Distance to mouth of river.	Danger-line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Waterce River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Camden, S. C.	45	24	5.0	1	1.7	18, 19	2.6	3.3
Savannah River.								
Augusta, Ga.	130	32	12.5	24	4.2	16, 18	5.7	8.3
Susquehanna River.								
Wilkesbarre, Pa.	178	14	1.0	28, 29	— 1.0	4-26	—0.7	2.0
Harrisburg, Pa.	70	17	2.2	29	0.5	15	1.0	1.7
Juniata River.								
Huntingdon, Pa.	80	24	3.8	24	2.8	1-23, 30	2.9	1.0
W. Br. of Susquehanna.								
Williamsport, Pa.	35	20	2.4	25	0.0	11, 12	0.7	2.4
Waccamaw River.								
Conway, S. C.	40	7	2.4	4	0.9	18	1.5	1.5

*Distance to Gulf of Mexico.

SPECIAL CONTRIBUTIONS.

THE HIGHEST KITE ASCENSIONS AT BLUE HILL.

By S. P. FERGUSSON (dated October 20, 1897).

On September 19, 1897, the kite meteorograph was raised to a height of 2,821 meters (9,255 feet) above the summit of the Hill, or 3,013 meters (9,885 feet) above sea level. The highest kite was 40 meters (131 feet) above the meteorograph, or 3,052 meters (10,016 feet) above sea level. The height reached by the meteorograph was 510 feet higher than that reached on October 8, 1896.

At the top of the line were two self-adjusting kites of the Hargrave pattern, having an area of 36 and 41 square feet. Five other kites of the same pattern, having an area of 22.9 square feet each, were respectively attached at the following distances from the top kites: 500, 1,500, 2,500, 3,500, and 5,000 meters. The length of the line employed was 6,300 meters, as shown by the register attached to the windlass. This register is made to indicate 1.5 per cent less line than is actually employed, in order to allow for sagging. The weight of the line was 59 pounds, and the pull, when 5,000 to 6,300 meters were out, varied between 104 and 152 pounds, the latter amount being about one-half of the breaking strain of the wire.

The instrument left ground at 0:01 p. m., and the highest point was reached at 4:17 p. m. At this time the angular altitude of the meteorograph (observed by means of a surveyor's transit) was 26.6°. At the windlass the angular altitude of the line was but little lower than that of the meteorograph. The work of reeling in the line began at 4:30 p. m., and the meteorograph reached the ground again at 6:40 p. m., having been in the air six hours and thirty-nine minutes, and during nearly five hours of this time, at a height of nearly 1 mile or more above sea level. There were stops of three to fifteen minutes after every 500 meters of line were let out or reeled in, and a stop of twenty minutes was made near the highest point.

The record obtained from the meteorograph is nearly complete, and is one of the smoothest that has been obtained. The record of relative humidity is incomplete at the highest point, and also a break of one hour's duration occurred in the record of height between 4 and 5 p. m. The record of temperature is complete.

The temperature at the highest point was 37.6° while at the Observatory it was 63°, the rate of fall being more rapid below the height of 2,000 meters above sea level than above it. The relative humidity rose rapidly until 700 meters was reached, then between 900 and 1,400 it fell lower than the humidity recorded at the Observatory. Between 1,450 and 1,900 meters the humidity was very high, and at 2,100 it fell again, afterward rising slightly at 2,200 meters and falling at 2,400 meters; above 2,500 meters it was very low, the trace going to 26 per cent and probably lower, the incompleteness of the record at the highest point rendering it impossible to determine the lowest reading. The wind at the ground was from the south and southwest during the entire flight, and varied in velocity from nearly 30 miles at noon to 20 miles an hour at 6 p. m. The direction of the wind gradually became westerly with increasing altitude, and above 2,000 meters it was almost exactly west.

On October 15, 1897, the meteorograph was raised to a height of 3,379 meters (11,086 feet) above the hill, or 3,571 meters (11,716 feet) above sea level. This height is 558 meters (1,831 feet) greater than that reached on September 19. The highest kite was 40 meters above the meteorograph, or 3,611 meters (11,847 feet) above sea level.

At the top of the line were a Lawson ribbed kite, having an area of 71 square feet, and an adjustable Hargrave kite, having an area of 36 square feet. Two other Hargrave kites, having an area of 22.9 square feet each, were respectively attached at distances of 2,000 and 3,500 meters from the top kites. The length of line employed was 6,300 meters, and the pull, when all the line was out, varied between 125 and 150 pounds. The instrument left ground at 3:48 p. m., and the highest point was reached at 6 p. m. The work of reeling in the line began at 6 p. m., and the instrument reached ground at 8:20 p. m.

The record obtained from the meteorograph is one of the best that has been secured, being complete, with very clear and smooth lines. (The meteorograph sheet is reproduced in facsimile as Chart VIII.)

The temperature at the highest point was 41°, and at the observatory it was 72°. An interesting feature of the flight was the passing of the meteorograph through the cumulus and alto-cumulus cloud levels, as shown by the increase, followed by decrease, of humidity at heights of 1,500 and 2,800 meters.

At the ground the wind direction was southwest during the entire flight, and the velocity varied between 13 and 22 miles an hour. Above the height of 1,000 meters the direction of the wind was northwest.

No mishap of any kind occurred during the experiments, the steam windlass reeling in the line easily and smoothly at a rate which was made to vary from 0.5 to 2.7 meters a second, according to the strain upon the line. The experiments were conducted under the direction of Mr. Rotch by Mr. Clayton, Mr. Sweetland, and the writer, and formed two of a series of high-level flights now being made with the aid of a grant of money from the Hodgkins fund held by the Smithsonian Institution.

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SEISMIC NOISES.

[During the past three years public attention has been frequently called to the noises known as "mistpouffers" on the coast of Holland, "barisal noises" in the Delta of the Ganges, and by various names on many other coasts. In this country, also, there are recorded the "moodus" noises in Connecticut, the rumbling and shaking preliminary to landslides in North Carolina and Pennsylvania, and the noises that prevailed for weeks in South Carolina after the Charleston earthquake. Occasionally noises are attributed to earthquakes that are really due to the passage of meteors overhead, but the two following articles certainly refer to noises issuing from the ground. In general, all such phenomena are worthy of investigation, and the Editor thinks it not improper to publish the two following papers, since it may well be that the phenomena here recorded are sometimes due to the action of frost and rain in the rocks beneath us.—C. A.]

EXPLOSIVE NOISES AT FRANKLINVILLE, N. Y.

By Dr. J. W. KALES (dated September 18, 1897).

About 9 o'clock a. m., October 10, 1896, the writer was driving on the Cuba road (see Chart VI) toward Franklinville, N. Y. At the point marked 1 on the map a loud explosive sound was heard which appeared to come from the center of East Hill. When point 2 was reached a similar sound was heard, also at point 3. These sounds succeeded each other at intervals of about five minutes. They closely resembled the sounds produced by coarse black powder used in blasting rocks in the construction of tunnels. The same sounds were heard at the same time by Mr. McStay at his residence, marked McStay. McStay attributed the sounds to the firing of cannon at Cuba, but there was no cannon at Cuba, 13 miles distant. East Hill lies between McStay's and Cuba. The dotted lines on the map all run through the center of East Hill. This hill is about 500 feet high, i. e., using the valley at Franklinville as a base. This region is covered with deep drift. The valley at Franklinville is filled with "till" 100 to 150 feet deep. The underlying rocks belong to the Chemung group, dip to the southwest, and are formed of thin lamellæ of sandy shale and thick beds of sandstone. The surface of the soil is strewn with quartz and limestone pebbles, sandstone, and granite boulders. Many moraines extend along the hillsides, showing that this section was once covered with glaciers. On the summit of East Hill is a large sandstone boulder in which is a depression—a mortar—said to have been formerly used by the Indians for grinding corn. Single sounds, like those described, are heard in the hills about here, but so far as the writer knows no series of sounds have been so closely located as those of October 10, 1896, in East Hill; they appear to be due to breaking of the strata of underlying rocks.

SEISMIC NOISES IN NORTH CAROLINA AND GEORGIA.

By BARRY C. HAWKINS, Voluntary Observer (dated October 8, 1897).

There are several instances of sounds in nature, for which no reasonable or proved explanation can be found and, probably, the most remarkable of these is the phenomenon known as the "barisal guns." The facts relating to these seem to be as follows: At a certain point near the seacoast in India, sounds are heard resembling distant cannon firing. These sounds have been extensively studied, but no reasonable hypothesis has been advanced which accounts for the "guns."

Mention has been made in the MONTHLY WEATHER REVIEW of certain sounds heard on Black Mountain, N. C., in 1876, and obviously caused by the slow falling or sliding and crushing of rocks. But I am going to describe a phenomenon which *seems* to be *very similar* to the famed "barisal guns," and located right in the United States. No account of these sounds has ever been published, and no scientist has ever taken the slightest interest in them, or paid any attention to them, so far as the writer knows.

In northern Georgia, in the extreme north of Rabun County, close to the North Carolina State line and thirty-fifth parallel of latitude, is Rabun Bald Mountain, forming one of the highest peaks on the very crest of the Blue Ridge. This mountain has the same bulky shape and long rambling ridges running for miles in all directions as are spoken of by Hugh Miller as characterising the gneissic mountains of Scotland. On the east side there is a small cliff over which a small stream falls in wet weather, and from the ranges to the east the peak appears in form exactly like a brace, viz, ~~. The entire mountain is of gneiss.

Now, on this mountain are heard mysterious sounds resembling distant cannon firing, and these sounds have been heard for many years, probably at least fifty; they have been heard in all kinds of weather and at various points on the mountain.

Numerous observers have noted the sounds, and two reliable gentlemen once spent a night on the summit. About 10 o'clock p. m., sounds were heard which were supposed to be

cannon firing in Walhalla, S. C., in celebration of the presidential election, this being in November, 1884; but soon the sounds were found to issue *from the ground* and from a ridge to the southwest of the mountain. The explosive sounds continued till late in the night. At times they seemed to proceed from the ground immediately under the observers. In early days when bears were plentiful the pioneers said the sounds were caused by these animals rolling small boulders off the mountain sides in search of worms, snails, etc., but the bears have passed and the sounds still continue. Later the sounds were ascribed to "harnts" (haunts or ghosts); two men were murdered in "the sixties" and buried at some unknown point on the "Bald." Some have heard these sounds so near them in the woods that the sound was like that of a falling tree. But ordinarily the sound is like distant firing, as noted above. They are not heard at all times, people having spent the night on the peak and heard nothing. The writer can verify all the statements made above. They are strictly true, and it is with the hope of calling the attention of scientific men to the subject that I present this brief account of the mystery of a mountain.

HURRICANE OF SEPTEMBER 6.

In connection with the hurricane of September 6 Mr. Joseph Ridgway, Jr., of St. Thomas, W. I., forwards the following extract from the report of Captain Rusch of the German steamship *Rhenania* from Hamburg, which encountered a severe hurricane September 6–7, N. 31° 45′, W. 47° 25′:

Up to 6 p. m., September 6, there was no appearance of bad weather; at 11 p. m., wind southeast by east; on September 7, 1 a. m., encountered full force of a hurricane, with wind northeast by north, force 12 on the Beaufort scale; barometer 29.55. At 4 a. m., wind southeast by east; barometer 29.20. At 5 a. m., foretopmast overboard; heavy seas cleared the deck; two officers' staterooms smashed; engine skylights and part of bulwarks washed overboard; one boat smashed; barometer 28.95. At 6:30 a. m., wind at its greatest force during the storm; barometer 28.70. At 7 a. m., wind south by east; barometer 28.75. At 8 a. m., wind southwest. At 11 a. m., wind moderated and at noon wind had died away. On the 4th Captain Rusch had spoken the English steamer *Wooler*, of London, which was then repairing her engine, probably after having passed through the same storm.

METEOROLOGICAL OBSERVATIONS MADE TO DETERMINE THE PROBABLE STATE OF THE SKY AT SEVERAL STATIONS ALONG THE PATH OF THE TOTAL ECLIPSE OF THE SUN, MAY 28, 1900.

By Prof. FRANK H. BIGELOW.

Having regard to the cost of establishing temporary eclipse stations, and the losses to science in case a clear view of the sun is not secured during totality, it is proper to determine as far as practicable the probable state of the sky along the path, with the view of selecting the best sites for the observations. To do this a study may be made of the cloud conditions prevailing annually along the shadow-track for a period of time including the date of the eclipse. Certain areas may show greater tendency to cloudiness than others, and this fact will have some weight with observers in choosing their stations.

The meteorological features are, of course, of too uncertain a nature to make it possible to precisely forecast the type of weather that will occur, because storm conditions in transit over the United States might for the day in question supersede the average normal state prevailing in the eclipse districts.

Attempts to thus give an idea of the probable weather conditions likely to occur have already been made in previous cases, at the suggestion of Prof. D. P. Todd. He claims complete success in Chili in 1893, and a partial success in Japan in 1896. The path of the eclipse in India, January, 1898, is being similarly studied. The observations in Japan and in India have been made by the Government Services. The eclipse track for May 28, 1900, passes over the Southern States, from New Orleans, La., northeastward to Norfolk, Va., and it will accordingly be surveyed by the United States Weather Bureau for the benefit of the astronomical expeditions.

The plan proposed by Professor Todd has been followed in this investigation as follows: Beginning with May 15, 1897, and continuing until June 15, 1897, so as to include May 28 centrally, observations were made at 66 stations, whose locations are shown on Chart VII, covering quite uniformly the portions of the States of Virginia, North Carolina, South Carolina, Georgia, Alabama, Mississippi, and Louisiana, over which the track is plotted. The only observations made at stations outside the northern and the southern limits of the path and included are Saluda, S. C., and Athens, Ga. The *general state of the sky* at 8 a. m., 8:30 a. m., and 9 a. m., was noted under the instructions, "observe carefully the state of the sky over the whole heavens, and enter the following notation: 0=sky entirely clear; 1=sky ¼ cloudy; 2=sky ½ cloudy; 3=sky ¾ cloudy; 4=sky all cloudy." At the same hours *the state of the sky near the sun* was observed using the notation: "0=sun clear from clouds; 1=sun in scattered clouds; 2=sun in a mass of clouds; 3=sun quite invisible." The observers, whose names appear in Table 2, were generally volunteers who did this work at the request of the Weather Bureau. Their cooperation has, therefore, been highly appreciated.

A specimen of the tabulation for Raleigh, N. C., is inserted for inspection as Table 1, but it is impracticable to reproduce the whole set of stations in the WEATHER REVIEW.

TABLE 1.—*Observations made at Raleigh, N. C., May 15 to June 15, 1897, by C. F. von Herrmann.*

Date.	General state of sky, a. m.			Sky near sun, a. m.			General description of the condition of sky. (Seventy-fifth meridian time.)
	8:00	8:30	9:00	8:00	8:30	9:00	
May 15	4	4	4	3	3	3	Disk of sun just barely visible occasionally between 8 and 9.
16	3	3	2	2	2	2	Disk of sun visible, but through thin to thick cirrus clouds.
17	0	0	0	0	0	0	Considerable haze, but not enough to interfere with astronomical observations.
18	0	0	0	0	0	0	Clear, except a few white cumulus clouds here and there.
19	0	0	0	0	0	0	No clouds, but considerable haze.
20	0	0	0	0	0	0	A little haze.
21	1	2	2	0	1	1	Thin cirro-cumulus over face of sun, 8:25 to 9:25, disk visible.
22	1	0	0	1	0	0	Thin cirrus at 8 a. m., soon disappearing; light haze remained, not thick.
23	0	0	0	0	0	0	Very little haze.
24	3	3	4	1	1	2	Cirro-cumulus.
25	0	0	0	0	0	0	Rather thick haze, approaching fine cirrus in texture.
26	0	0	0	0	0	0	Rather thick haze in vicinity of sun.
27	0	0	0	0	0	0	
28	1	1	1	1	1	1	Cirrus, sun mostly clear of clouds.
29	4	4	4	3	3	3	Cloudy, rainy weather.
30	4	4	4	3	3	3	
31	4	4	4	3	3	3	
June 1	1	3	4	0	1	2	Nearly clear at 8 but becoming quite cloudy by 9 a. m.
2	4	4	4	3	3	3	
3	4	4	4	3	3	3	Cloudy, rainy weather, strato-cumulus.
4	4	4	4	3	3	3	
5	4	4	4	3	3	3	
6	1	1	1	1	1	1	Alto-cumulus, cumulus.
7	4	4	4	3	3	3	Strato-cumulus.
8	4	4	4	3	3	3	
9	4	4	4	3	3	3	
10	1	1	1	1	0	1	A few alto-cumulus.
11	0	0	0	0	0	0	Few cirrus, not near sun.
12	2	2	3	2	2	2	Cirrus over face of sun, not obscuring disk.
13	0	0	0	0	0	0	Some haze in vicinity of sun.
14	4	4	4	2	2	2	
15	0	0	0	0	0	0	
Total.	62	64	66	44	44	47	

In order to present the result in compact form, the sums of

the numbers entered in the tables, like Table 1, under the respective columns, are collected in Table 2. This indicates the total cloudiness recorded. Then the total sums of the three several observations under the two general heads are transferred from Table 2 to the chart, where near the name of a station appears two numbers. The left-hand number is the total cloudiness recorded in the above notation for the whole sky; the right-hand is the total cloudiness for the sky near the sun. The maximum number, if complete cloudiness prevailed every day at the three observations, would be 394 for the general state of the sky, and 288 for the sky near the sun. The totals can, therefore, be readily reduced to percentages, on dividing them by this maximum number.

TABLE 2.

Stations.	Observers.	General state of the sky, a. m.				Sky near the sun, a. m.			
		8:00	8:30	9:00	Sum.	8:00	8:30	9:00	Sum
Virginia.									
Cape Henry	B. A. Blundon	71	72	67	210	35	40	40	115
Norfolk	J. J. Gray	58	55	59	172	48	40	43	131
North Carolina.									
Willeyton	H. C. Williams	57	55	50	162	42	47	40	129
Gatesville	J. T. Walton	62	61	61	184	42	43	42	127
Winton	S. S. Daniel	45	38	32	115	26	24	22	72
Tarboro	E. V. Zoeller	54	54	54	162	38	39	39	116
Weldon	T. A. Clark	46	46	45	137	37	30	28	85
Rocky Mount	Gaston Battle	37	31	30	98	25	22	19	66
Springhope	G. W. Bunn	63	62	64	189	41	41	42	124
Wilson	W. S. Harriss	37	39	41	117	32	25	28	77
Louisburg	T. B. Wilder	50	43	41	134	27	23	22	72
Auburn	Troy Poole	42	44	48	134	24	26	25	75
Selma	Dr. R. J. Noble	57	57	55	169	44	44	40	128
Raleigh	C. F. von Herrmann	62	64	66	192	44	44	47	135
Pittsboro	A. H. Merritt	56	50	44	150	40	35	30	105
Moncure	W. H. Thompson	45	45	39	129	32	30	23	85
Fayetteville	Frank Glover	48	44	48	140	38	31	35	104
Laurinburg	L. D. McKennon	35	36	25	96	28	29	19	76
Rockingham	J. M. Stansill	41	41	40	122	29	27	29	85
Wadesboro	W. K. Boggan	27	29	29	85	18	17	19	54
Monroe	T. A. Ashcroft	61	54	53	168	42	38	38	118
South Carolina.									
Cheraw	J. H. Powe	52	52	51	155	39	38	37	114
Lancaster	J. C. Foster	68	67	66	201	45	41	39	125
Santuck	E. W. Jeter	51	48	46	145	35	33	31	99
Little Mountain	J. M. Sease	63	59	54	176	42	36	30	108
Prosperity	J. Perry Cook	36	34	34	104	29	27	26	82
Cross Hill	E. T. McSwain	30	30	30	90	23	23	23	69
Saluda	E. L. Mathis	47	43	40	130	32	30	28	90
Greenwood	M. M. Colhoun	30	32	31	93	30	32	31	93
Trenton	C. A. Long	26	29	29	84	17	17	17	51
Troy	A. C. Kennedy	69[1]	68[1]	67	204	47[1]	36[1]	35	118
Watts	J. W. Thomas	42	38	37	117	34	29	29	92
Mount Carmel	J. D. Cade	33	30	38	91	19	22	28	69
Georgia.									
Leverett	W. C. Powell	27	34	31	92	13	20	20	53
Elberton	H. A. Roebuck	15	14	13	42	12	11	10	33
Camak	J. A. Chapman	24	20	17	61	18	15	11	44
Crawfordville	J. P. Moody	45	46	42[1]	133	24	28	28	80
Athens	C. D. Cox	31[2]	30[2]	27[2]	88	17[2]	17[2]	17[2]	51
Covington	J. S. Carroll	27	28	23	78	19	22	21	62
Talbotton	W. T. Dennis	30	33	28	91	11	14	13	38
West Point	T. J. Jennings	14	12	9	35	11	8	8	27
Columbus	J. W. Long	8	11	11	30	6	10	9	25
Alabama.									
Smith Station	A. H. Frazer	22	21	20	63	17	18	17	52
Fort Mitchell	John Cantey	26	27	29	82	18	18	19	55
Auburn	James T. Anderson	21	18	18	57	20	14	15	49
Loachapoka	W. W. David	19	21[1]	16	56	10	13	11	34
Tallassee	J. T. Jarman	26	23	21	70	20	19	18	57
Union Springs	P. L. Cowan	26	29	30	85	19	21	23	63
Matthews	W. D. Dillard	18	16	14	48	15	13	12	40
Montgomery	F. P. Chaffee	19	16	14	49	14	14	13	41
Highland Home	S. Jordan	8	8	9	25	4	3	3	10
Fort Deposit	C. E. Rein	8	8	8	24	6	7	6	19
Greenville	F. E. Dey	11[3]	8[1]	9[1]	28	12[3]	9[1]	5[1]	26
Pineapple	J. S. Crum	19	22	20	61	19	17	16	52
Castleberry	S. Castleberry	22	22	19	63	19	19	17	55
Bay Minette	M. J. Wilkins	33	32	45	110	20	27	27	74
Latham	M. McGowan	15	15	15	45	7	7	6[1]	20
Mobile	W. M. Dudley	29	22	22	73	17	14	12	43
Mount Vernon	C. Becker	23	20	19	62	21	17	15	53
Citronelle	Dr. J. G. Michael	23	20	21	64	11	7	13	31
Louisiana.									
Poydras	P. F. Relimpio	48	46	45	139	14	13	13	40
New Orleans	R. E. Kerkam	28	41	40	109	13	21	22	56
Houma	Mrs. K. M. Haggerty	22	20	17	59	12	11	8	31
Paincourtville	J. E. Le Blanc	33	38	43	114	24	28	34	86
Franklin	J. M. Bonney	45	49	54	148	31	33	34	98
Centerville	T. P. Boutte	21	22	22	65	14	22	25	61

[1] One day missing. [2] Two days missing. [3] Four days missing.

An inspection of Table 3, percentage of cloudiness, shows that the conditions in the *interior of Georgia and Alabama were better than in North Carolina, South Carolina, or Louisiana.*

TABLE 3.—*Percentage of cloudiness by States.*

Name of the State.	General sky.	Near the sun.
North Carolina	35.8	33.3
South Carolina	34.7	32.1
Georgia	18.4	16.0
Alabama	15.2	14.9
Louisiana	26.5	21.5

Judging from this table it would be much safer to locate in central Georgia or Alabama, upon the southern end of the Appalachian Mountains, *where the track crosses the elevated areas*, than nearer the coast line in either direction, northeastward toward the Atlantic coast, or southwestward toward the Gulf Coast.

TABLE 4.—*Average cloudiness for the several months of the year, as deduced from long series of observations* (*scale* 0–10).

Stations.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Cape Henry, Va.	5.8	4.9	5.0	5.0	4.4	4.5	4.7	5.1	4.4	4.2	4.9	5.3	4.8
Norfolk, Va.	5.4	5.5	5.1	4.8	4.8	4.8	4.8	5.1	4.7	4.2	4.7	4.8	4.9
Raleigh, N. C.	5.6	6.5	5.4	4.7	4.8	5.1	5.6	5.7	5.2	4.3	4.6	4.7	5.2
Charlotte, N. C.	5.7	5.3	5.0	4.6	4.8	5.1	5.2	5.2	4.8	3.9	4.3	4.8	4.9
Atlanta, Ga.	5.7	5.5	4.7	4.4	4.5	5.1	5.2	5.4	4.4	3.8	4.5	5.1	4.9
Chattanooga, Tenn	6.1	6.0	5.2	4.8	4.7	4.9	4.9	5.0	4.5	4.1	4.8	5.7	5.1
Montgomery, Ala.	6.0	5.9	4.8	4.6	4.4	5.2	5.3	5.0	4.4	3.8	4.6	5.4	5.0
Mobile, Ala.	5.5	5.4	4.9	4.8	4.4	5.1	5.3	5.0	4.5	3.7	4.4	5.2	4.8
Meridian, Miss	5.1	6.1	5.1	5.1	4.9	5.5	6.3	5.6	4.2	2.5	4.3	5.1	5.0
New Orleans, La.	5.3	5.2	4.8	4.8	4.3	4.7	4.9	4.7	4.3	3.5	4.5	5.2	4.7

To exhibit the average cloudiness for these districts, as compiled from data extending over many years, Table 4 is added. It indicates that there is a minimum of cloudiness for May in the South Atlantic and Gulf States, and therefore this season of the year is generally favorable for eclipse work.

An examination of the several days of the interval, May 15 to June 15, 1897, shows that days of cloudiness occurred from May 29 to June 9, the remaining days being generally clear. An inspection of the daily weather maps for the same period shows that from May 15 to May 29, areas of high pressure persistently covered the South Atlantic States, giving fine, clear weather; from May 30 to June 15, the high areas were located in the northwestern districts of the United States, that is, in the Missouri Valley, causing low pressures and lowering skies in the Southern States. Rain areas tended to prevail in the Mississippi Valley, and also on the North Atlantic coast, in which districts the conditions would have been much less favorable for seeing the eclipse than in Georgia and Alabama. It is intended to repeat these observations during the years 1898 and 1899, after which we shall be as well informed as possible regarding the selection of the eclipse stations for the year 1900.

FORESTS AND RAINFALL.[1]

By Prof. H. A. HAZEN (dated September 15, 1897).

Can it be possible that the cutting away of forests affects the amount of precipitation in any locality? To many, no doubt this question will seem easy of answer, but we find the results of study by no means reassuring, and recent investigations have led to almost diametrically opposite conclusions, depending, somewhat at least, upon the feeling of the writer. When we reflect that our rain storms are of very wide extent, oftentimes over 1,000 miles in diameter, and may take their origin and bring their moisture from distances of 1,000 miles or more, the thought that man, by his puny efforts, may change their action, or modify it in any manner, seems ridiculous in the extreme.

It has been well established that forests have a most im-

[1] Presented at the annual meeting of the American Forestry Association at Nashville, Tenn., September 22, 1897.

portant bearing upon the conservation of rainfall; that the forest floor permits a seepage of water to the source of springs and thus maintains their steady flow; that they hold back the precipitation that falls, especially in the form of snow, thus preventing or ameliorating the effects of dangerous freshets. There is not the slightest doubt of their great importance to the welfare of man, but all these facts do not affect the question of their influence upon precipitation. The following paper is prepared from the standpoint of a meteorologist, and is an attempt to present facts.

Formerly, the historical argument was a favorite one, I quote one of these: "It is a familiar fact that there are many regions in Asia and southern Europe, once exceedingly fertile and densely populated, that are now utterly sterile and desolate. The country bordering on the Euphrates and portions of Turkey, Greece, Egypt, Italy, and Spain are now incapable of cultivation from lack of rain due to deforestation." The most fertile of all provinces in Bucharia was that of Sogd. Said Malte Brun in 1826, "For eight days we may travel and not be out of one delicious garden." In 1876 another writer says of this same region: "Within thirty years this was one of the most fertile spots of central Asia, a country which, when well wooded and watered, was a terrestrial paradise. But within the last twenty-five years a mania of clearing has seized upon the people, and all the great forests have been cut away and the little that remained was ravaged by fire during a civil war. The consequences followed quickly and this country has been transformed into a kind of arid desert. The water courses are dried up and the irrigating canals are empty." It has also been said that in the older settled portions of New England and the Middle States there are arid hills and worn-out fields, due to the falling off of precipitation from the cutting away of the forest growth. Such quotations and statements might be made to fill a large volume. Without more precise data as to rainfall it would be hazardous to conclude that we have here a case of cause and effect. It is certain that the fertility of these regions in ancient times was due to stupendous irrigating devices and canals, and when these were neglected, through wars and other untoward circumstances, the fertility necessarily ceased. It is certain that there are ruins of enormous irrigating ditches and canals in Babylonia, where history indicates that there was once a teeming population and great fertility, but where now only a sandy desert greets the eye.

Some have said that where our densest forests are found there we have the greatest precipitation. There is no way whereby we can see that such forests would have started unless favored by rainfall, so that the presence of the forest rather indicated the earlier occurrence of practically the same rainfall as at present. Meteorologists are agreed that there has been practically no change in the climate of the world since the earliest mention of such climates. Plants found in mummy cases in Egypt that were plucked thousands of years ago show the same size as those now found in that land. The "early and the latter rains" are experienced in Palestine to-day just as they were four thousand years ago. Jordan "overflows all its banks" to-day, in February, precisely as it did in Joshua's day. When we come down to recent times and to the records of rainfall measured in New England for more than one hundred years or, at least, before and since the forests were cut, we find a constancy in the rainfall which shows its entire independence of man's efforts. Right here it should be noted that totally barren lands of any extent, in New England for example, are to be found only in imagination. Even where the forest has been cut away mercilessly there springs up a growth of sprouts which covers the ground and answers almost the same purpose in causing rainfall (if there is any effect of that kind) as the forest. Even where land is entirely cleared of a forest we have at times the green pasture, and at others still heavier crops which leave the ground anything but a sandy waste.

But the strongest argument adduced in the past to show the influence of forest on rainfall has existed in a comparison between rain-gauge measures in the forest and the open field. Such records have been made for more than thirty years in France and Germany and surely we must have here, if anywhere, a sufficient proof of a forest's influence.

Admitting that we have perfect instruments and careful observers, there still remains a most serious doubt as to the immediate environment of each gauge and as to the possibility of a direct comparison. It is probable that no two gauges 2,000 feet apart can be placed so as to catch the same amount of rain, though to all appearances the exposure is faultless in each case. This is plainly seen on the roof of a building. For example, before the office of the Weather Bureau was removed to its present location in Washington, eighteen rain gauges were placed on the roof and one upon the sod not 500 feet away. There was only one of the gauges that gave the same rainfall in all storms as the one on the sod. Some of the others gave more in some storms and some less, but all of them in the total rainfall of eight months gave less than the one which compared exactly with the sod gauge. In an early publication of rainfall records in this country (not by the Weather Bureau, however,) two stations are given, Marengo and Riley, in Illinois, not more than 3 miles apart, but yet differing by 19 inches in the total annual precipitation for several years. I have no doubt that in the latter instance one or both gauges were badly exposed; but enough has been said to show the extreme caution needed in studying such records and the absolute necessity that exists in obtaining a comparison between gauges that are not affected harmfully by their surroundings.

One of the best of all researches in this line has been conducted at Nancy, in France. Within a distance of 5 or 6 miles there have been four stations established. At Nancy in the open and at Belle-Fontaine in the forest; and, 500 feet higher vertically, Amance (open) and Cinq-Trancheés (forest). The latter stations are in a more hilly region and can not be compared together, as can the former. At the lower stations we have comparative observations for twenty-five years. I have summed these in three groups, containing eight, eight, and nine years in each group. First group, Nancy (open), had 31.16 inches, while Belle-Fontaine (forest) had 32.46 inches; second group, 33.39 inches and 34.07 inches; third group, 30.05 inches and 29 89 inches. We see that while the first eight years showed a very slight excess in the forest rainfall over that in the open field, in the last nine years (including 1894, last published) the open station showed a little more rain than the forest station. These observations were made with particular care, for the purpose of exactly determining the influence, and may be relied on if the environments of the gauges were comparable. At Amance (open) and Cinq-Trancheés (forest) the observations have not been quite so regular, though we have twenty-five full years of records at these two stations, but not the same years as at the other stations. Amance shows 26.70 inches and Cinq-Trancheés (forest) 33.39 inches, or an apparent preponderance of 6.7 inches a year in the forest. This would make more than 20 per cent greater in the forest than in the open. It should be borne in mind, however, that these last two stations are on an eminence, and are not strictly comparable, and this result can not vitiate that at the two other stations, which shows no effect.

In Germany we have a rather remarkable record of a slightly different character. Lintzel is a station on the Luneburg heath, which began to be planted with trees in 1887, at the rate of 1,000 to 1,500 acres a year, and in a few years over 8,000 acres were covered. In the midst of this forest is the meteorologic station in an open field of some 75 acres. Before plant-

ing the forest 97 per cent of the surface was field, meadow, or heath, and afterward 80 per cent was forest and 20 per cent was roads, open field, and heath. Around this station, pretty evenly distributed, and within 50 miles, there are thirteen rainfall stations, which have been carefully established and presumably are comparable with the Lintzel station in the midst of the growing forest. There is no means of knowing whether any of these stations have been changed or not, but for our purpose we may consider the material homogenous and treat it accordingly. Records from 1882 to 1896 (fifteen years) are available. Charts were prepared for each year showing the ratio between the Lintzel record and that at each station of the thirteen. There is no space for these charts, but, in place of them, I give here the mean of all the thirteen station ratios for each year: 1882, 81; 1883, 83; 1884, 101; 1885, 103; 1886, 82; 1887, 98; 1888, 93; 1889, 122; 1890, 97; 1891, 100; 1892, 90; 1893, 96; 1894, 142; 1895, 128; 1896, 136.

These figures are extremely significant, and may be further elucidated as follows: The smaller ratios show a less rainfall at Lintzel, or, these figures are the percentage of rainfall at Lintzel as compared with surrounding stations. It is impossible to determine whether these trees have reached the culmination of their effect or not. In 1896 most of them would be seventeen years old, and the ground would probably be fairly covered. It is a great pity that the environment was changed or some accident happened at Lintzel so as to vitiate the three last years. (An inquiry was sent to Germany regarding the error, but no response has yet been received.) The record does not seem to show any appreciable effect upon the precipitation; in 1884 the ratio was 101, while in 1893, nine years later, it was 96. It is probable that no definite and unassailable result can ever be obtained either by the method adopted in France or this later one in Germany. The rainfall is so variable within a distance of even a mile or two, and it is so difficult, if not impossible, to obtain similar environments at all the stations, that no decisive result can be obtained. It will be seen readily that the multiplication of stations will do no good, and, above all, that the observation of rainfall under trees in a forest is absolutely useless for any such discussion or study as this.

It seems probable that if two or three lines of stations could be established a mile or two apart on four sides of an enormous forest, each line to have a dozen stations or so, about 3,000 feet apart, four of the stations to be outside of the forest and the others each in a large, cleared space of at least 2 acres extent in the forest, something decisive might be obtained. It should be noted, however, that from the evidence already accumulated there would be very little to be gained by a further study of the question. It is certain that the effect, if there be one, is almost inappreciable. The favoring conditions over the forest are balanced by those not favoring and the integrated effect is practically the same in the two cases.

Prof. H. F. Blanford, of India, determined from a most careful series of records, from which all known errors had been eliminated, that the forest had a tendency to give 2 per cent more rain than contiguous open fields, That is, if an open place had 50 inches of rain in a year a near by forest would have only 51 inches, which is practically inappreciable.

It would be an interesting study to select all those cases in experiments in forest and near by fields in which the wind was blowing either from the forest to the field, or *vice versa*. It is evident that if there is any effect on rainfall by the forest, it would be vitiated if not exactly reversed by such winds.

There is a class of visual observations which seem to show an effect upon rainfall by the forest. Probably many have seen heavy clouds passing over a plain, but which only precipitated as they passed over a forest. Also in a hilly region it is a frequent phenomenon that fog and low lying cloud hover near a forest, and not over an open plain. One also notes very often in passing into a forest on a damp day that the trees drip moisture, possibly condensed from moisture evaporated from the damp earth underneath. Observations of this nature, however, can not ordinarily be checked by instrumental means, but show in a general way that the forest tends to conserve vapor and moisture which in the case of the open field would be diffused into the atmosphere.

REPORT ON THE OPERATION OF THE MOUNT TAMALPAIS STATION FOR SEPTEMBER, 1897.

By W. H. HAMMON, Forecast Official.

The station is on a comparatively narrow neck of land (about 8 miles wide) between the ocean and the Bay of San Francisco, and across the Golden Gate (entrance to San Francisco harbor) from San Francisco and about 13 miles distant therefrom. It is on a very abrupt peak, 2,592 feet high, at the eastern end of a short range of mountains running east and west across the peninsula. From the peak the surface declines very abruptly almost to sea level on the north, east, and south faces.

It is an ideal place for an observatory, in that nothing obscures the outlook and because the point is above all disturbing influences of local conditions and topography. At San Francisco wind directions and velocities are greatly influenced by the surrounding hills. Moreover, the intense heat of summer in the interior valleys of the State causes a most remarkable indraft from the sea on summer afternoons and nights, which more than half the time in such seasons is laden with fog, and the latter either surrounds the observer or obscures the sky at the hours of observation. On fourteen out of the twenty-three p. m. observations which have been repeated to me from the city a westerly wind exceeding 20 miles per hour has been reported. On but four of these occasions has the wind at this station reached that velocity, and three of these were during a severe northwest gale, which occasioned a most unusual cold wave in the Pacific Coast Region. More than half the time at the hours of observation the valleys and sea below have been obscured by fog, but only on three occasions has the fog enveloped the peak. While the sky has been reported obscured at fifteen of the observations repeated from San Francisco, on only five occasions has that been the case here.

It is believed that the conditions observed here are of especial value to the forecaster. Rain has been recorded at some of the stations in northern California on fifteen weather maps. On fourteen of these occasions it has been preceded from twelve to forty-eight hours on the mountain by high winds and gales, amounting to 350 miles or more per day, the force of the wind being in a measure proportional to the extent and severity of the storm. The one exception was a trace of rain at San Francisco, which was merely a mist precipitated from a low cloud or fog entirely below the summit of the mountain. With one exception there has been no instance when the wind has reached a movement of 400 miles per day that rain has not followed within thirty-six hours. The exception was when a gale on the 13th continued on the 14th and rain occurred on the night of the 13th and 14th.

Another indication of rain which is especially observable here is the unusual visibility of the air.

From this peak cumulo-stratus and cumulo-nimbus clouds, which precede and accompany local showers in the valley, can be seen and their courses followed for 100 miles or more at times when the smoke and dust of lower elevations would obscure them at much shorter distances. The dust and smoke of forest fires usually ends quite abruptly at about 1,500 or 2,000 feet elevation.

There have been two occasions this month when marked falls in temperature have occurred. In each instance a sudden decline has been observed on the mountain, accompanied by a severe northwest gale, the greatest fall being from one to two days before the marked fall has occurred in northern California and Nevada.

The a. m. and p. m. observations of September 6 showed falls of 16° and 7°, respectively, at the mountain station and a northwest gale prevailed from the evening of the 5th to morning of the 8th. The p. m. observation of September 7, and a. m. of September 8, twelve hours later, showed changes of from 10° to 30° at all interior stations in Oregon, Idaho, California, Nevada, Utah, and Arizona, the fall being to freezing in western Oregon and northern Nevada. On the 13th a moderate northwest gale prevailed, but no fall in temperature occurred here or in northern California. On the 14th, however, the temperature fell from 8° to 15° throughout the greater portion of Oregon, Nevada, Utah, and Arizona. On the 20th a moderate gale sprung up from the northwest, and on the morning of the 21st quite a moderate fall in temperature occurred. The p. m. observation showed a similar fall in the interior valleys of California. The a. m. observation of the 26th showed an abrupt decline of 23° on the mountain, accompanied by a northwest gale, which continued until the night of the 27th, the temperature continuing low. On the morning of the 26th changes of from 8° to 10° were reported from Redbluff, Fresno, and Carson City, which were followed by further declines until the p. m. observation of the 27th, which showed changes aggregating from 14° to 30° in the interior of the State, and on the evening of the 28th and the morning of the 29th changes of from 10° to 20° occurred in western Oregon, Idaho, Nevada, and Utah, resulting in freezing weather in northern Nevada.

While the barometric conditions accompanying northers in California are quite well understood, it has frequently been impossible to accurately predict the time when the temperature will begin to rise upon the approach of a "norther," and likewise to determine the date of its ending. Frequently the wind will be high from the north in the valley for several days and no marked change in temperature will occur, and again it will begin to rise with the first north wind. From my observation this month I believe the conditions on the mountain will aid materially in these forecasts. Usually during warm weather in the interior there is a most remarkable temperature inversion between this station and the city. At times the temperature here is more than 20° warmer than at the base of the mountain. The anomaly is so great as to cause the correction of the barometer for elevation, based on the mountain temperature, to be too small by nearly 0.10 of an inch. With the passage to the northward of a high from the sea to the interior (the usual norther condition) there is at first, here, a northwest gale, accompanied by cool weather, during which time there is no rise in temperature in the interior valleys, but as the gale diminishes the wind shifts to north or northeast, and the temperature begins to rise, although the wind may still be west on the coast below, and no change in direction occurs in the valleys. Likewise, in cooling after the passage of the "norther" no marked change will occur until the temperature falls on the mountain with a return of westerly wind.

Further, it seems likely that this remarkable temperature inversion will furnish the key to an explanation of the fogs which prevail so frequently at San Francisco and at other points on this coast, and perhaps lead to a means of more satisfactorily forecasting the commencement of each period and its severity. The temperature inversion occurring, as it does, with an area of high pressure to the northward, is certainly evidence of an overflow of warm air from the interior toward the coast. This results from the less density of the hot air of the interior compared with the colder air over the ocean, which apparently causes a reversal of pressure gradients at a moderate elevation, and the warm air of the interior is carried westward over the sea, where it must rapidly give up its surplus heat, at the same time sinking toward the surface. Thus, a local circulation is set up between the valleys and the sea near the shore. As the warm air passes over the sea it receives moisture by evaporation, at the same time lowering its temperature until the amount received is in excess of what it can hold as vapor when cooled to the sea temperature and fog results.

While I have not had the time to carefully study this question as yet, I have observed many evidences of this tendency for a reversal of air movements with elevation during heated periods in the interior and preceding and during foggy periods on the coast. Among these evidences are the inversion of temperature and the decidedly smaller proportion of westerly winds on such occasions at this elevation than in the city. Frequently east and northeast winds prevail here during at least a portion of the day, while such is very seldom the case in the city.

In making this report I have confined my attention to conditions made manifest at this station, and not so observable elsewhere. Also, I have referred to merely those conditions of which it would seem that the knowledge gained by this station gave promise of an improvement of forecasts. It must be remembered that I have had no opportunity of observing during a winter storm and for but one month in summer, but I am sure the additional information obtained of summer rains, so injurious to drying fruits and raisins, and the warnings given of cold waves, which a little later in the autumn and in the early spring result in the destructive frosts, are sufficient to warrant the maintenance of this station.

I have not referred to the opportunities here offered for the investigation of many subjects of interest to the science of meteorology outside of those useful to the forecaster, although this peak, at the extreme western edge of the continent, is well adapted to such purpose.

Among other uses which will render the station valuable must be mentioned the possible use of it as a reporting station of vessels approaching this port.

NOTES BY THE EDITOR.

OLD WEATHER RECORDS.

In the "Transactions" of the New York State Agricultural Society for the year 1859, there is published an elaborate report by the Hon. George Geddes, of Fairmount, on the history, geology, climate, and agriculture of Onondaga County. In this Report, at page 296, Mr. Geddes states:

Observations of the temperature have been taken at Fairmount at a point 520 feet above the sea for more than sixty years; and during that time a standard instrument in the shade, protected from all reflection, has never been observed to mark more than 94° in the hottest weather, and this but once in many years; and there have been but few days in the coldest weather that the mercury was not, at some time in the day, above zero. February 5 and 6, 1855, were the coldest days ever known here (February 5, 6 a. m., 28° below zero; February 6, 6 a. m., 30° below zero). During this unprecedented weather the sky was nearly cloudless, and as there was no wind, the severity of the weather was not so apparent.

As Mr. Geddes was a resident of Fairmount it seems plausible that he refers to some record of the temperature kept at

that place by members of his own family, but so far as we can learn this temperature record for Fairmount is not referred to in any of the published tables of temperature data for the State of New York. A record that began about the year 1800 and was continuous until 1859, or later, would be of great value in climatological studies, and if this record still exists it should be not only preserved but made accessible for the use of students of climatology.—[C. A.]

RECENT EARTHQUAKES.

September 18, at Brigham City, Utah, 10:45 a. m.

September 25, throughout eastern Maine, as follows: Bangor, 1:05 p. m., lasting ten seconds, heavy rumbling noise and alarming shaking of houses; Thomas hill, highest part of Bangor, 1:07 p. m.; Brewer, more severe than in Bangor; Bingham and Somerset, about 1:00 p. m.; Solon and neighborhood, lasted four seconds; Belfast, two shocks at 1:05 p. m., the first lasting *five* and the second lasting *ten* seconds; also felt in the neighboring towns of Winterport, Brooks, Searsport, Liberty, Burnham, City Point, Swanville, and Waldo; Farmington, 1:03 p. m., lasting five seconds; Rockland, a few minutes after 1:00 p. m., and at all places in its neighborhood.

September 2, St. Thomas, W. I., at 11:30 a. m., a rather sharp earthquake shock of scarcely any duration, commonly known here as a "rumble and a jerk."—[C. A.]

DEPTH OF HAIL FALL.

It is very common for observers to state that hail fell during a given storm, and to specify the size of the hailstones, but no measurement or estimate is given as to the quantity of hail, expressed in depth of fall, as is done in the case of snow and rain. During the past summer several remarkable falls of large hailstones have been reported, as in the subjoined list. In each of these and in similar cases it is desired to know how large an area is covered by the hail and what would be the depth of the equivalent uniform layer of solid ice uniform over the whole area. In the case of the storm reported by Mr. Jennings, at Topeka, Kans., a photograph was sent to the Editor, which appeared to show that over a portion of the landscape the hailstones lay upon the ground just about contiguous to each other, and the stones averaged, from the observer's own measurement, 4 inches in diameter. The thickness of the equivalent layer of ice is, therefore, the depth to which each sphere would cover its corresponding regular circumscribed hexagon. Now, the volume of the sphere is 4/3 by 3.1416 times the cube of the radius; the area of the circumscribed hexagon is 2 by 1.7320 by the square of the radius. Therefore, the sphere of ice will cover its hexagon to the depth of 1.209 multiplied by the radius of the sphere. In other words, a layer of contiguous spheres of ice 4 inches in diameter is equivalent to a solid layer of ice 2.418 inches thick. A layer 7 inches deep of hailstones a quarter of an inch in diameter, or one-eighth of an inch radius, would be equivalent to about 1.06 inch of ice. The factor 1.209 will enable any observer to convert his hail fall into an equivalent sheet of ice. The remarkable hailstorms to which we have alluded were the following:

Topeka, Kans., 1897, June 24, first thunder heard at 6:55 p. m. in the north and the last at 8:45 p. m. in the south; wind before the storm, south, after the storm, northeast; temperature before the storm, 88°, afterwards, 72°; hail began at 7:35, ended, 7:40 p. m., 4 inches in diameter; hail began again, 7:38, ended, 7:43 p. m., and 0.7 in diameter; hail began again, 7:48, ended, 7:50 p. m., 0.4 in diameter; rain began at 7:35, ended, 8:15 p. m.; total amount, 0.28. While the big hail was falling the observer measured a dozen, with the following resulting diameters: 6.00, 5.25, 5.00, 4.75, 4.00, 3.50, 3.00; the average being 4.00 inches. Some of the largest stones were merely aggregations of small stones, while many of them were solid ice in layers, like an onion; one, weighing 2 pounds, went through the roof of the electric power house. The barometer rose 0.2 inch and returned to its former reading. The temperature fell from 88°, at 6:30, to 79°, at 8 p. m., and then, in a few moments, to 69°, the pen rising and falling over the same space until it had badly blurred the record. The wind whipped to north as the hail began and attained a maximum velocity of 35 miles, which, however, did not extend to the western limits of the city. Many stones emitted light on striking the hard pavement.

Pueblo, Colo., June 24, first thunder, 7:44 p. m.; storm came from the southwest and moved toward the northeast; temperature before the storm, 78°, afterwards, 63°; maximum wind during the storm, 36 miles, from the northeast; hail began at 8:15 and ended at 9 p. m.; it began again at 11:25 and ended at 11:40 p. m. The largest seen by the observer measured one-half inch in diameter and was conical in shape, as were most of the stones that were examined. The hail was much heavier in the southern portion of the city, and for a few miles southward, where lumps of ice measuring 3¾ inches in diameter and weighing 8¾ ounces were reported.

An account of a remarkable hailstorm is buried in the Transactions of the American Institute for the years 1864–65, Vol. XXIV. We quote from page 323 of that volume. Mr. J. M. Root described the hailstorm of June 10?, 1849, on the great plains of western Nebraska, 50 miles east of Fort Laramie (N. 42° 12′, W. 104° 31′, in eastern Wyoming). Some of the stones which fell measured 14 inches in circumference; they were composed of solid ice with smaller portions adhering to them; he noticed that some of these hailstones were of conical form and only about 3 inches in circumference. The hailstorm lasted from ten to fifteen minutes. On the same page Mr. Maynard describes the hail that fell in New York City in August, 1862, as having had a conical shape, while others were described by Dr. Rowell as concave and resembling somewhat a rough oyster shell.—[C. A.]

HIGH LEVEL STATIONS IN JAMAICA.

The publications of the Weather Office at Kingston, Jamaica, consist of monthly or occasional bulletins published first in the Jamaica Gazette and reprinted as a regular series of reports, and annual summaries published in the official "Handbook of Jamaica" especially for 1881 and 1893. These publications give in detail the observations made at Kingston at 7 a. m. and 3 p. m. daily, also a monthly summary for seven stations as to pressure, temperature, wind, and cloud; the monthly rainfall and extremes of temperature for Blue Mountain Peak (7,423 feet above sea level) and, finally, the monthly rainfall data for about 250 stations distributed over the whole island. No detailed observations are made at the summit of Blue Mountain, owing to the expense of maintaining an observer on this place, which is not easily accessible; the monthly record is obtained by ascending the peak as nearly as possible on the last day of each month. Until the establishment of a permanent station on some peak, such as St. Johns (6,100) or Blue Mountain (7,423), it is probable that the station at the Cinchona Plantation, called Hill Gardens (N. 18° 5′, W. 76° 39′; altitude, 4,907 feet), will continue to be the highest on the island; it is about seven miles west-southwest of the summit. We are pleased, therefore, to have the privilege of publishing a portion of the record for Hill Gardens in detail, in lieu of that for any higher station, inasmuch as the changes going on in the upper strata undoubtedly work downward toward the earth's surface and will, when we have learned to properly interpret them, enable us to understand the storms and weather of the lower strata.—[C. A.]

Meteorological record at Hill Gardens, Jamaica.

August, 1897.	Pressure.		Temperature.				Dew point.		Relative humidity.		Precipitation.	Wind.			
												Direction.		Movement.	
	7 a. m.	3 p. m.	7 a. m.	3 p. m.	Maximum.	Minimum.	7 a. m.	3 p. m.	7 a. m.	3 p. m.		3 p. m.	7 a. m.	3 p. m. to 7 a. m.	7 a. m. to 3 p. m.
1....	25.36	25.35	63	66	69	58	61	62	96	87	0.45	se.	se.	25	10
2....	25.35	25.34	64	68	70	58	53	62	67	81	0.05	se.	se.	5	5
3....	25.35	25.36	63	68	72	60	57	62	80	81	0.00	e.	.....	5	0
4....	25.39	25.43	65	68	74	60	59	64	81	87	0.00	e.	e.	5	5
5....	25.40	25.47	66	73	76	59	62	64	87	73	0.00	e.	e.	5	5
6....	25.45	25.44	66	69	75	61	62	63	87	81	0.00	e.	e.	10	5
7....	25.46	25.41	64	71	75	60	62	60	93	68	0.00	se.	e.	15	5
8....	25.45	25.41	62	68	70	60	58	64	86	87	0.00	se.	.....	5	0
9....	25.39	25.38	62	77	78	60	58	55	86	46	0.28	se.	e.	10	4
10...	25.45	25.41	62	75	76	62	57	66	70	73	0.00	se.	se.	200	80
11....	25.35	25.35	65	69	77	61	57	65	75	87	0.00	se.	se.	25	10
12....	25.37	25.36	64	63	66	60	62	61	93	93	0.00	se.	e.	275	25
13....	25.43	25.42	63	71	75	58	52	65	67	81	2.15	se.	e.	25	5
14....	25.39	25.40	61	72	78	59	59	61	93	68	0.00	se.	e.	50	5
15....	25.42	25.38	66	69	70	58	64	62	93	78	1.10	se.	se.	125	10
16....	25.40	25.41	62	74	75	60	58	58	86	57	0.07	se.	se.	185	25
17....	25.40	25.41	64	72	76	61	58	61	80	68	0.00	se.	e.	100	10
18....	25.43	25.42	64	73	77	59	54	59	72	61	0.00	e.	e.	55	5
19....	25.44	25.43	65	69	76	60	61	62	87	78	0.00	e.	e.	50	10
20....	25.43	25.43	64	66	72	61	60	64	86	91	0.00	se.	e.	5	5
21....	25.42	25.41	64	68	72	61	60	64	86	87	0.00	se.	e.	5	10
22....	25.46	25.40	66	70	74	59	62	66	87	87	0.00	se.	....	10	0
23....	25.43	25.43	64	69	70	60	56	62	75	78	0.00	e.	.....	5	0
24....	25.45	25.45	64	64	70	61	58	62	80	93	0.00	e.	.....	5	0
25....	25.38	25.36	64	64	72	58	58	62	80	93	0.40	se.	se.	50	5
26....	25.39	25.32	64	70	72	61	58	66	80	87	0.25	se.	se.	150	15
27....	25.36	25.33	62	64	70	60	58	62	86	93	0.15	se.	.....	10	0
28....	25.32	25.32	63	65	69	56	52	63	67	93	0.16	e.	se.	5	5
29....	25.37	25.33	64	65	69	58	62	63	93	93	0.07	se.	se.	15	5
30....	25.34	25.34	65	64	69	60	59	62	81	93	0.00	e.	.....	10	0
31....	25.35	25 33	61	66	69	60	59	64	93	91	0.25	e.	.....	5	0
	25.408	25.393	63.7	68.4	72.5	60.0	58.6	63.0	83	81	5.38	ese.	ese.	46.7	8.6

FORMS OF LIGHTNING.

In his meteorological essays, Arago collects and classifies the descriptions of the different forms that lightning assumes. The *first class* consists of narrow, thin, sharply-defined, luminous lines which may have crimson, violet, or bluish colors. These lines may be classified as straight or slightly curved, zigzag or broken lines, greatly curved and even reentrant, and, finally, forward and return, very nearly resembling the capital letter V. We have also single flashes that bifurcate into a collection of smaller flashes that may number anywhere from two to one hundred, the double and triple forks being least frequent. To these varieties the Editor would add a sinuous form of lightning flash that he has seen on several occasions, both in Chicago and Washington, in which the flash appears to run with comparative slowness, horizontally, along the under surface of a cloud, dying out after it has pursued a path whose apparent angular length is from *one* to *five* degrees. No noise whatever usually accompanies this lightning, although the flashes may be in the zenith. When last observed, in May, 1897, it seemed possible that these might be simply long flashes viewed endwise, so that the apparent path, which was sometimes so curved as to form a complete oval or spiral, was simply the projection of what would from another location have appeared to be a long flash between an upper and a lower cloud.

The *second class* recognized by Arago is that of the diffuse lightning, spreading over immense surfaces, often of an intense reddish tinge, but sometimes blue or violet, and which in America and England are spoken of as "heat lightning," but which are more properly called "sheet lightning." During an ordinary thunderstorm the sheet lightning is far more frequent than the flash lightning.

The *third class* includes the mysterious "globular or ball lightning" which rolls about on the ground and has thus far defied all attempts at satisfactory explanation.

As a *fourth form* of electric discharge we must reckon the continuous emission of light from the surface of certain clouds. As these clouds are low, and as the light dies away after a few minutes only to be renewed again after a short interval, we must consider this light as due to myriads of little flashes between the particles of the clouds without appreciable noise.

Besides the lightning interchanged between the clouds, or the clouds and the earth in ordinary weather, a still more interesting *fifth class* should be made of those that play between the earth and the cloud of ashes and vapor formed above a volcano in active eruption.

There does not seem to be any evidence that in these five classes there is any special new production of electricity. We have only to consider the earth as the electrified body, permanently electrified and always, by induction, inducing electric manifestations in every substance that is near to it. The auroral light ought to be included as one form of the lightning discharge, since it is certainly a form of electric discharge modified by the rarity of the upper atmosphere from the flash to the stratified sheet lightning. The electric discharge is modified, not merely by the rarefaction of the dry atmosphere of oxygen and nitrogen, but still more so by the rarefaction of the other gases in the atmosphere, such as the hydrocarbons and the carbonic acid gas, and probably also by that of the aqueous vapor, so that air, which is very dry or very cold, and therefore contains but little aqueous vapor, may have much to do with the formation of auroras. According to the recent researches of Professor Trowbridge, the character of the electric current as to intensity and quantity is also a prime factor in determining the character of the luminosity. He has been able to reproduce a great variety of forms of lightning, such as have been photographed from time to time by proper alterations in his apparatus.—[C. A.]

RESULTANT AND PREVAILING WINDS.

In response to a request from Mr. Fred. A. Tower, voluntary observer at Concord, Mass., the Editor submits the following note with reference to the meaning and the method of deducing the resultant and the prevailing winds.

The resultant may be conceived of as computed by either one of two different methods. Both give the same resultant but suggest very different interpretations as to what that resultant means. In the first method, the observer plots upon a sheet of paper the wind movement, as to its length and direction, for the first hour; at the end of that line as a starting point he plots the motion for the second hour, and at the end of that the motion for the third hour, and so on. His sheet of paper soon becomes covered with a very irregular broken line and if at any moment he stops this process and draws a heavy straight line from the start point to the end point, this will represent, both in length and direction, the resultant wind. When constructed in this way, under the implied assumption that the individual observed winds are all horizontal motions, the diagram accords with the idea that a particle of air has actually followed this irregular broken line, and has finally arrived at its end point just as a vessel, sailing irregularly in all possible directions, must finally arrive at a spot that represents the resultant of its efforts to sail in a straight line. Such diagrams and such an interpretation are perfectly proper for vessels on the ocean, and especially for plotting ocean currents by means of floating wrecks, but the interpretation is not proper in the case of the wind because it is probable that a particle of air never pursues a horizontal movement for any long period of time.

The second method of computing the resultant consists in classifying all the movements according to the direction in which they occurred, and summing them up so that we have, as a grand total, *a* miles from the north, *b* miles from the northeast, *c* miles from the east, etc. The north and south movements partly offset each other, so also the northeast and southwest, the east and west, the southeast and northwest,

so that we finally have four equivalents which may then be combined into one resultant. This resultant will be the same as that obtained by the preceding graphic method, but it suggests a very different interpretation, viz, we do not think of a particle of air as having traveled continuously during the whole time to a very considerable distance away from the station, but rather consider it as having been kept at the station and successively subjected to these various hourly movements. From this point of view the resultant expresses what happened at the station to the wind vane and anemometer, and does not lead us to imagine that any great mass of air necessarily took part in the movements. This is a more rational interpretation, for every station is liable to have local peculiarities which must not be allowed to interfere with our interpretation of the general movements of the atmosphere in its neighborhood.

The total resultant above referred to considers all the observations made continuously hour by hour and day by day, but we may classify the observations by hours and compute the resultants for each hour separately. If we wish a total resultant, and are willing to base it upon only a few hourly resultants, we may select such hours as will give resultants that are approximately the same as those deduced from twenty-four hourly observations, and this is, approximately, what is done when we compute resultants from 8 a. m. and 8 p. m., as is done for the regular Table VIII of the MONTHLY WEATHER REVIEW. If, furthermore, experience should show that resultants computed by using the exact measured miles per hour differ but little from resultants computed by assuming that the average velocity of the wind is the same for all hours of the day, then one might be justified in omitting the labor of plotting or calculating the exact number of miles, since the defects of one hour would make up for the excesses of the next. This further simplification is especially allowable when, as in the computations for Table VIII, we restrict ourselves to an approximation deduced from two observations per day. The resultant winds given in Table VIII have not, thereby, lost in accuracy so much as we might at first thought anticipate. Their accuracy is quite comparable with that of the other meteorological elements with which they are likely to be compared, more especially the barometric gradients shown upon Chart No. IV, whose isobars are also based upon observations at 8 a. m. and 8 p. m.

The figures in the four principal columns of Table VIII are, therefore, deduced from the simple count of the frequency of the wind directions at 8 a. m. and 8 p. m., without having regard to the velocity or force of the wind; for instance, at Eastport, Me., the 60 observations during 30 days were distributed as follows: North, 10; northeast, 4; east, 4; southeast, 2; south, 10; southwest, 8; west, 8; northwest, 9; calm, 5. The four northeast winds are equivalent to 3 north and 3 east. Similarly, the southeast 2 are equivalent to 1 south and 1 east; the southwest 8 are equivalent to 5 south and 5 west; the northwest 9 are equivalent to 6 north and 6 west, so that if we add the four components we have north wind, 19; south wind, 16; east wind, 8; west wind, 19. The five calms do not affect the motion. The balance between north and south leaves north, 3; the balance between east and west leaves west, 11. Therefore, the resultant is a movement of 3 from the north and 11 from the west, which is the same as a movement of a little over 11 from the direction north 80° west.

The prevailing wind is determined by simply selecting that wind direction which occurs most frequently, that is to say, in the preceding case for Eastport, north and south would have an equal claim on our attention because both occurred 10 times, and the northwest would be almost on the same footing because it occurred 9 times. The prevailing wind does not convey to the mind any proper idea of the wind at a station unless some one direction occurs in an overwhelming majority of cases. The actual number of winds from each direction must be enumerated if we would have a datum that in any way replaces the resultant wind. Such a detailed statement is all the more important when there is a large number of winds alternately opposed to each other, thus in the case of strong land breezes by night and sea breezes by day, the resultant may be zero, or very small, whereas the statement of the frequency of each wind, or the analysis into the four principal components, gives one a clear idea of the alternate opposition of these breezes.—[C. A.]

FROST FORMATION IN ST. PAUL.

Mr. H. Volker, observer, Weather Bureau, St. Paul, Minn., has kindly forwarded to the Editor an account of an interesting case of frost formation. He submits a rough draft of the iron bridge across the Mississippi at Robert street. This bridge consists of iron framework, 870 feet long, as its southeastern portion and a similar framework, 330 feet long, as its northwestern portion. The central portion of the bridge is an iron truss, 340 feet long, resting on two slender stone pillars at 80 feet above low water. The central portion of the roadbed of the bridge is horizontal, while the roadbeds connecting this with the extremities have a gentle slope. Mr. Volker observed that on the early morning of September 20, when the minimum temperature at the Weather Bureau station was 38°:

> Not a sign of frost was to be seen on the level, central portion of the roadway, but on both inclines it was formed copiously, and, what was most remarkable, the line of frost extended up the inclines to the very point where the level portion begins, both on the northwest and on the southeast sides.

Mr. Volker states that the formation of frost was due not merely to the elevation and the cooling by radiation, but that—

> The sloping condition of the roadway was especially favorable for frost formation, and, if this had continued, frost would still have formed at a higher elevation, probably for hundreds and possibly for thousands of feet. From this I conclude that frost on sloping elevations, sides of hills and mountains, is formed in the same manner. If radiation and elevation were the only causes in such frost formations, then in this case frost should have disappeared gradually and not abruptly, for the elevation of the upper ends of the sloping roadways was equal to that of the level portion of the bridge.

We have no doubt that Mr. Volker is correct in attributing the abundant formation of frost on the sloping roadways to that inclination itself. Unless there were great differences in the velocity of the wind, the whole surface of the road, both horizontal and inclined, would cool down to about the same temperature during the nighttime, and the quantity of frost would depend principally upon the quantity of cold air flowing gently over the surface of the roadway. If there were no wind, then this quantity must have been much greater down the sloping approaches than along the central, level part, owing to the fact that the flow of air over the level portion is almost *nil*, while that down the slope is very appreciable. It can, however, happen that the slope may be too steep for the deposition of frost. Anyone can make the experiment by exposing at nighttime several wooden planks at a few feet above the ground, one of them horizontal, another slightly, and a third steeply inclined. There should be a raised rim on the edges of the planks, so as to force the air to flow downward the whole length of the planks. If, as we suppose, Mr. Volker's explanation is correct, the deposit of frost should be thickest on the plank that has a gentle slope.—[C. A.]

THE HANDBOOKS OF THE DEUTSCHE SEEWARTE.

One of the most important lines of practical work undertaken by the Deutsche Seewarte when reorganized in Decem-

ber, 1874, as a National Institute for Terrestrial Physics, was the preparation of an elaborate series of so-called "Sailing Directions," or handbooks for navigators sailing over the important commercial ocean routes. This great work has been accomplished, with a thoroughness characteristic of all Neumayer's works, by the successive publications of the "Segelhandbuch for the Atlantic Ocean," in 1885, and the "Atlas of 36 Charts" to accompany this in 1882; "Segelhandbuch for the Indian Ocean" in 1892, and "Atlas of 35 Charts" to accompany this in 1891; finally, the "Segelhandbuch for the Pacific Ocean," in 1897, and the "Atlas of 31 Charts" to accompany it in 1896. Meanwhile the accumulation of data has justified a revised edition of the Atlantic handbook, which will probably be published by the close of 1897. These three handbooks are treatises that summarize our knowledge of the three corresponding oceans and the atmosphere above them. The thirty or more charts give the latest details as to the depth of the ocean, its temperature, its currents, and specific gravity; the atmospheric temperature, pressure, winds, rains, cloudiness, and storms; the magnetic elements of declination, inclination, and intensity; finally, the principal routes for vessels, the whale fisheries, and other commercial matters. Each handbook of text, besides referring to its Atlas of Charts, also contains numerous additional special charts illustrating the minor details. To the meteorologist these handbooks are as valuable as to the navigator, since they make accessible to him the results of the studies of Neumayer, Koeppen, Koldeway, Schott, Boergen, Knipping, and others, at the Seewarte. The data from the logs of German vessels are accumulated in the archives of the Seewarte. They contain not merely the summary for the use of navigators, but laborious compilations, in clearly written text, by some of the ablest German scholars, and are well worthy of the study of other meteorologists.

The meteorology of the Pacific Ocean is considered in the last published handbook where we find two chapters on the winds; a chapter on the pressure of the air and its relation to the winds; a chapter on the temperature of the air and the rainfall; an elaborate treatment of the storms that have prevailed in various parts of the Pacific, preceded by a general introduction in which the whirlwinds and the squalls are distinguished from each other. We shall from time to time have occasion to quote from these three volumes of handbooks. At the present moment the following paragraphs on pages 178–179 of the volume for the Pacific Ocean seems appropriate:

DIURNAL VARIATION OF PRESSURE AND WIND.

The variations of the barometric pressure are partly periodic, that is to say, repeating themselves at regular intervals, and partly nonperiodic. The annual and the daily periods are prominent examples of these. The diurnal variation is of such remarkable magnitude and regularity in the tropics that it can not be neglected, since it constitutes a considerable fraction of the general oscillation. The pressure rises every day, with the regularity of the clock, from 4 a. m., local time, to 9:30 a. m., then it falls until 4 or 5 p. m.; then it again rises until 10 p. m. only to fall again until 3 or 4 a. m. The total extent of this daily oscillation amounts to two or three millimeters (viz, $\frac{2}{25}$ or $\frac{3}{25}$ of an inch). These oscillations have no relation to the weather. If, therefore, the barometer falls three millimeters, between 10 a. m. and 4 p. m., we are from that not to argue anything as to change in the weather, but we may indeed do so if during this time it had not fallen or has risen. Disturbances in the daily variation of the barometer, especially a fall between 4 and 10 a. m., or 4 and 10 p. m., are sometimes the first sign of a disturbance in the trade wind, or an approaching cyclone. Beyond the tropics the diurnal oscillation of the barometer is more and more obscured by the great irregular variations of pressure, and beyond 40° of north or south latitude the former plays practically no important role. The following small table contains some results of the bi-hourly observations on the Pacific Ocean made on the exploring voyage of the *Challenger;* each line is the mean of observations made during from ten to thirty-three days, during which the vessel did not materially change its geographic latitude. The figures indicate in millimeters and tenths how much the mean barometric pressure for the respective hours differed from the daily mean. Besides this double diurnal variation the accurate comparative observations demonstrate the presence of a simple diurnal oscillation which is different on the land and on the open ocean and which makes the pressure greater over the land than over the ocean during the nighttime, but greater over the ocean than over the land during the afternoon. The land and sea breezes owe their origin to this slight difference of pressure.

Diurnal variation of the barometer on the Pacific Ocean.

[Extracted and condensed from "Voyage of the Challenger," Vol. II, Part 5, A. Buchan, Table III, pp. 7–9.]

Latitude.	Longitude.	2 a.m.	4 a.m.	6 a.m.	8 a.m.	10 a.m.	Noon.	2 p.m.	4 p.m.	6 p.m.	8 p.m.	10 p.m.	Midnight.
		Mm.	*Mm.*	*Mm.*	*Mm.*	*Mm.*	*Mm.*	*Mm.*	*Mm.*	*Mm.*	*Mm.*	*Mm.*	*Mm.*
N. 36	E. 151 to W. 156....	−0.4	−0.4	0.1	0.4	0.5	0.3	−0.2	−0.4	−0.2	−0.1	+0.2	0.0
N. 22	E. 114, Hongkong .	−0.1	−0.3	0.1	1.0	1.3	0.5	−0.8	−1.1	−0.8	−0.1	0.2	0.3
0	E. 127, New Guinea	−0.4	−0.5	−0.1	0.9	1.1	0.2	−0.7	−1.1	−0.6	+0.1	0.7	0.2
S. 1	E. 147, New Guinea	−0.5	−0.8	0.1	1.0	1.2	0.5	−0.7	−1.0	−0.6	−0.1	0.5	0.4
S. 17	W. 150, Tahiti.....	−0.3	−0.5	0.1	0.7	0.9	0.3	−0.8	−1.2	−0.5	+0.2	0.6	0.5
S. 36	E. 153 to E. 167	−0.3	−0.6	−0.3	0.5	0.6	0.3	−0.4	−0.4	−0.2	+0.2	0.3	0.3
S. 37	W. 135 to W. 83....	−0.3	−0.6	−0.1	0.3	0.4	0.2	−0.1	−0.3	−0.1	+0.1	+0.3	+0.2
S. 50	W. 74, Patagonia .	−0.1	+0.2	0.6	0.4	0.2	0.0	−0.2	−0.3	−0.3	−0.4	−0.3	−0.1

Other facts that have been explained in Chapter IV show that in many cases another cause affects these diurnal variations of the wind more powerfully than this slight interchange of pressure between the land and ocean. Thus, for instance, on the leeward side of a small island (in the trade-wind belt) the land wind does not at nighttime replace the sea wind of the daytime, but calms occur in the nighttime, and powerful gusts of wind from the land in the daytime. In such cases we have to do with a phenomenon that is quite the same as occurs in the lowlands generally, where the general current of air (which at nighttime is to be found at an altitude of many hundred meters above the earth's surface, while at the earth's surface itself the air is held stagnant by the irregularities of the surface) is at midday, by the play of the ascending and descending movements above the heated soil, brought down to the latter in oft-repeated gusts. Many islands are too small to produce the true land and sea breezes; such, for example, is the case on the leeward side of the island of Oahu in the neighborhood of the city of Honolulu. On the other hand, the sea breeze occurs most powerfully where the general current of air that descends in gusts at the warmest time of the day, by reason of the vertical interchange, agrees in its direction with the sea wind that occurs about the same time, as, for example, at Valparaiso.

LOCAL WINDS OF HAWAII.

Chapter IV gives in detail the local peculiarities of the wind at prominent points on the coasts of continents and islands throughout the whole extent of the Pacific Ocean. Among these the following extract on pages 145–146, relative to the Hawaiian Islands, is translated as being apparently the item referred to:

The Hawaiian Islands lie somewhat to the south of the Tropic of Cancer, or the so-called horse latitudes. Corresponding to this location, the northeast trade wind blows almost uninterruptedly at this place during six months of the year, from May to October, inclusive. In December the polar limit of the steady trade winds has advanced southward from the island, and the struggle of the trade with the westerly winds begins and continues into March. The average number of days with trade winds, at Honolulu, for the years 1875–1889, were as follows:

January, 14; February, 15; March, 17; April, 21; May, 24; June, 26; July, 29; August, 30; September, 26; October, 22; November, 18; December, 16.

In the summer months, in the neighborhood of the islands, during the nighttime calms prevail, except in front of and in the passages between the islands. In the course of the forenoon the trade wind in the neighborhood of the land freshens until by midday it is generally strong, but in the afternoon gradually again diminishes. This is certainly the case on the lee side of the lower islands and portions of the islands, especially in the harbor of Honolulu; for the windward sides there is not yet enough data to speak positively. On the other hand, on the west side of Hawaii, the largest island, there is in the summer time a regular interchange of land and sea breezes. This, however, is only the case in localities where, on the windward side of the place, the mountain chain rises up so high that it cuts off the trade wind, which latter rarely extends beyond 2,400 meters. Above the plain of Waimea, which is only 900 meters high, to the north of the mountain of Mauna Kea (whose summit is 13,953 feet, according to Stieler's Hand Atlas), the trade wind blows overhead and strikes on the lee side as a dry, parching wind. South of this in the Kona District, directly to leeward of the high mountain of Mauna Kea, which cuts off the trade wind, the daily interchange of land and sea breezes occurs in the typical manner; at sunrise, calms prevail; about 10 o'clock the sea breeze

sets in, blowing from the west, and gradually ascends the mountain sides; then, clouds rapidly form and soon there falls over the land rain that often continues till nighttime. About 9 or 10 p. m. the sea breeze ceases and shortly after that the descending land wind sets in; this is a dry wind; the clouds break away, the stars appear, the rest of the night is clear.

In the winter months the westerly winds of the Hawaiian Islands are caused by barometric depressions that pass in an eastward direction to the north of the islands. In such cases the wind begins to freshen up from the south and veers gradually to the southwest, many times accompanied by thunderstorms with cloudbursts of rain and not unfrequently increasing to a severe storm. After it has stormed for a while from this direction, the wind suddenly jumps to the northwest, then follows clearing-up weather, and soon after that the northeast trade again begins. The storm wind just described, which by the natives is called Kona, because it prevails principally on the Kona side, that is to say, the lee or the southwest side, has a duration of from a few hours to two or even three days. It is seldom strong enough on land to injure the houses, but occasionally interrupts navigation between the islands, as for example, in 1868. During the cruise of the English naval vessel *Petrel* among the Hawaiian Islands in September, October, and a part of November, 1875, the trade wind was often interrupted by southerly winds and calms with rain, except in the passages between the islands, where it seldom failed. On the west and southwest coast of Maui southeasterly winds prevailed, but which were occasionally replaced by the northeast trade which blows steadily over the isthmus of this island.

The island of Maui consists of a northwestern mountainous portion and a southeastern portion containing much higher mountains; between these is the connecting isthmus of comparatively low land to which the author of the Handbook evidently refers.

With regard to the depth of the layer of air involved in the movement of the northeast trade wind, the Handbook says:

On Mauna Loa and Mauna Kea, the two great mountains of the island of Hawaii, we do not generally find the trade wind blowing above 2,500 meters, no matter how strong it may be blowing below. From 2,500 up to 3,800 meters, calms prevail, and above that the current of wind has the opposite direction. In a corresponding manner the lower trade-wind clouds move from northeast to southwest, while the upper cirrus clouds move in the opposite direction, from southwest to northeast. The altitudes from 1,100 to 2,100 meters, are almost always on Hawaii enveloped in clouds, but from the upper portion of Mauna Loa (altitude, 13,760 feet) one looks out upon a sky that is always clear in summer and of wonderful purity. The summit of Haleakala, on the island of Maui, more than 160 kilometers distant toward the northwest, appears sharp and clear above the ocean of clouds, like a dome above a field of snow. The storms that prevail on these peaks appear to come from the southwest or the northwest.—[C. A.]

MEXICAN CLIMATOLOGICAL DATA.

Through the kind cooperation of Señor Mariano Bárcena, Director, and Señor José Zendejas, vice-director, of the Central Meteorologico-Magnetic Observatory, the monthly summaries of Mexican data are now communicated in manuscript, in advance of their publication in the *Boletin Mensual;* an abstract translated into English measures is here given in continuation of the similar tables published in the MONTHLY WEATHER REVIEW during 1896. The barometric means have not been reduced to standard gravity, but this correction will be given at some future date when the pressures are published on our Chart IV.

Mexican data for September, 1897.

Stations.	Altitude.	Mean barometer.	Temperature.			Relative humidity.	Precipitation.	Prevailing direction.	
			Max.	Min.	Mean.			Wind.	Cloud.
	Feet.	*Inch.*	° *F.*	° *F.*	° *F.*	%	*Inch.*		
Arteaga (Coahuila)	.....	.....	88.9	53.6	70.2	.....	0.55	.....	.....
Barousse	5,414	.....	78.4	59.2	67.6	.....	0.75	.....	.....
Colima	1,656	.....	...	.....	79.3	.....	.....	.....	.....
Durango	6,241	24.10	80.6	45.0	66.2	51	1.82	.....	e.
Leon	5,934	24.34	80.1	43.0	65.1	66	2.44	ene.	e.
Linares (New Leon)	1,188	.....	91.4	51.8	71.4	71	3.27	.....	.....
Magdalena (Sonora)	4,948	.....	.....	.....	81.1	.....	5.55	ne.	ne.
Merida	50	29.89	96.6	67.1	80.8	77	1.69	n.	w.
Mexico (Obs. Cent.)	7,472	23.11	75.6	44.6	59.9	71	5.62	nw.	ne.
Mexico (E. N. de S.)	.....	23.09	80.2	46.4	61.9	66	5.91	ne.	.....
Monclova (Coahuila)	1,926	.....	91.0	64.6	81.9	.....	0.55	.....	.....
Monterey	1,626	28.37	91.9	54.0	76.1	72	5.40	e.	se.
Morelia (Seminario)	6,401	24.01	73.2	46.9	58.5	77	5.73	ne.	e.
Oaxaca	5,164	25.10	84.2	48.4	68.0	75	3.68	nw.	e.
Parras (Coahuila)	3,986	.....	80.8	60.6	68.5	.....	1.50	.....	.....
Puebla (Col. Cat.)	7,112	23.40	79.5	38.3	67.5	59	7.00	.....	.....
Queretaro	6,070	24.24	77.0	45.9	63.7	66	3.30	e.	.....
Saltillo (Col. S. Juan)	5,399	24.89	84.7	49.1	67.8	62	0.47	w.	se.
San Luis Potosi	6,202	24.16	74.7	47.7	63.7	70	1.33	e.	se.
Sierra Mojada (Coah)	.....	.....	96.4	54.0	75.0	....	0.28	.....	.....
Torreon (Coahuila)	3,720	.....	95.4	65.1	81.3	.....	1.38	.....	.....
Vaqueria (Coahuila)	.....	.....	83.1	50.5	66.9	.....	3.86	.....	.....
Zacatecas	8,015	22.57	74.3	40.3	61.3	71	3.89	e.	e.

METEOROLOGICAL TABLES.

By A. J. HENRY, Chief of Division of Records and Meteorological Data.

For text descriptive of tables and charts see page 357 of REVIEW for August, 1897.

TABLE I.—*Climatological data for Weather Bureau Stations, September, 1897.*

Stations.	Elevation of instruments.			Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.										Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.			Wind.				Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
	Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Mean actual, 8 a. m. and 8 p. m. + 2.	Mean reduced.	Departure from normal.	Mean max. and min. + 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.					Total.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Direction.	Date.					
New England.							61.0	+ 0.1												1.99	— 1.2										
Eastport	76	69	74	29.96	30.05	+ .02	55.2	0.0	89	10	62	38	28	48	36	51	49	82		1.82	— 1.4	10	6,991	nw.	30	nw.	28	7	6	17	6.7
Portland, Me	103	81	89	29.96	30.06	+ .01	59.0	+ 1.3	94	10	68	39	22	50	35	53	49	72		2.34	— 0.7	9	4,783	nw.	30	s.	19	15	10	5	4.2
Northfield	872	15	59	29.20	30.14	+ .07	54.9	— 1.2	90	10	68	28	22	42	43	50	48	83		1.43	— 1.4	8	5,328	s.	36	nw.	28	9	14	7	5.3
Boston	125	115	181	29.98	30.12	+ .05	63.1	+ 1.0	94	10	72	41	28	54	29	57	53	74		2.38	— 0.5	7	7,540	w.	30	nw.	26	16	6	8	4.0
Nantucket	14	43	54	30.11	30.12	+ .02	62.4	— 0.5	82	10	68	46	28	57	18	58	55	79		1.31	— 2.0	9	7,876	sw.	33	ne.	17	12	10	8	5.1
Woods Hole	.....	51	57	.....	.....	.....	62.5	— 0.9	85	11	68	44	28	57	20	....	....	....		0.93	— 2.2	7	9,745	sw.	42	nw.	21	21	3	6	3.0
Vineyard Haven	.....	20	....	.....	.....	.....	64.6	+ 0.2	88	*	72	45	28	58	22	....	....	....		0.80	— 3.0	7	.....	sw.	....	....	...	17	7	6	....
Block Island	27	39	48	30.10	30.13	+ .05	63.4	+ 0.7	86	11	69	45	28	58	20	59	56	80		3.95	+ 1.0	9	10,642	sw.	42	ne.	23	16	12	2	3.4
Narragansett Pier	.....	10	....	.....	.....	.....	61.8	— 0.4	90	11	71	33	28	53	32	....	....	....		2.50	— 0.7	7	.....	s.	....	....	...	20	1	9	....
New Haven	107	118	140	30.01	30.13	+ .04	63.0	+ 0.6	93	10	73	38	28	53	29	58	54	75		2.42	— 1.3	8	6,029	n.	27	sw.	24	19	3	8	3.3
Mid. Atlan. States.							63.2	+ 0.7												1.34	— 2.5										
Albany	97	84	113	30.05	30.16	+ .09	62.6	— 0.3	94	10	73	38	22	52	33	56	52	77		1.87	— 1.6	7	4,670	s.	31	n.	11	16	9	5	4.0
Binghamton	875	79	90	.....	.....	.....	60.4	.....	92	16	73	33	22	48	47	....	....	....		3.03	.....	9	3,456	ne.	24	n.	17	17	9	4	5.9
New York	314	298	326	29.81	30.14	+ .05	65.4	— 0.8	91	10	73	44	28	58	26	59	55	72		1.64	— 2.1	6	8,986	sw.	42	nw.	17	19	6	5	3.3
Harrisburg	377	94	102	29.77	30.17	+ .08	66.8	+ 2.4	95	10	78	41	22	56	31	58	53	67		1.30	— 2.8	5	4,088	nw.	33	ne.	23	20	5	5	3.0
Philadelphia	117	168	184	30.03	30.15	+ .05	68.4	+ 0.8	96	10	78	45	21	59	28	60	55	67		1.10	— 2.2	5	6,864	sw.	27	n.	17	17	6	7	3.8
Atlantic City	52	68	76	30.10	30.15	+ .07	66.9	+ 0.7	94	11	74	41	21	60	25	63	60	78		0.36	— 3.1	3	8,037	sw.	31	ne.	23	19	7	4	3.3
Baltimore	123	68	82	30.03	30.15	+ .05	68.8	+ 0.6	97	11	79	45	21	58	31	61	56	68		2.17	— 1.7	4	3,295	n.	17	n.	23	22	6	2	2.3
Washington	112	59	76	30.05	30.17	+ .06	68.2	+ 0.8	97	11	80	42	28	57	38	61	57	75		1.54	— 2.2	3	3,894	n.	28	nw.	16	19	8	3	2.7
Cape Henry	.....	5	34	.....	.....	.....	72.4	0.0	94	9	79	52	30	66	26	....	....	....		0.32	— 4.2	4	.....	se.	....	....	...	17	8	5	....
Lynchburg	685	83	88	29.45	30.17	+ .08	70.6	+ 1.7	99	14	84	40	29	57	44	60	55	66		1.12	— 2.7	3	2,339	e.	20	nw.	20	23	5	2	2.1
Norfolk	57	88	93	30.11	30.17	+ .08	72.2	+ 1.0	95	11	81	49	29	64	25	66	63	80		2.01	— 2.6	6	5,249	ne.	26	ne.	22	22	4	4	2.8
S. Atlantic States.							73.8	0.0												3.83	— 1.6										
Charlotte	773	68	76	29.34	30.14	+ .05	72.6	+ 2.2	97	14	84	50	29	62	30	62	56	65		0.90	— 2.5	4	4,345	ne.	24	ne.	22	19	7	4	3.4
Hatteras	11	17	36	30.14	30.15	+ .08	73.7	+ 0.2	85	14	78	60	21	70	12	69	67	81		2.02	— 4.4	7	7,940	ne.	50	nw.	3	15	10	5	4.1
Kittyhawk	9	12	30	30.13	30.14	+ .09	71.8	— 1.4	89	13	78	50	18	66	26	68	66	82		1.61	— 3.0	7	10,771	ne.	48	ne.	22	17	10	3	3.6
Raleigh	375	93	101	29.77	30.15	+ .04	73.0	+ 2.8	98	14	84	48	29	62	30	63	58	65		0.70	— 3.0	3	4,398	sw.	26	n.	22	19	8	3	3.1
Wilmington	78	82	90	30.07	30.15	+ .08	73.0	— 0.2	94	*	82	52	21	64	26	66	64	80		1.54	— 4.9	10	5,271	ne.	26	ne.	22	17	5	8	4.1
Charleston	48	60	72	30.10	30.15	+ .09	75.4	0.0	90	17	81	56	22	70	17	69	66	78		2.61	— 4.0	8	8,983	ne.	50	n.	21	11	14	5	4.6
Columbia	.....	5	....	.....	.....	.....	74.0	+ 0.2	100	15	85	45	23	63	32	....	....	....		2.49	— 1.6	4	.....	ne.	....	....	...	14	8	8	....
Augusta	180	89	103	29.94	30.13	+ .08	74.6	— 0.8	98	15	85	46	22	64	32	66	63	75		3.66	— 0.3	5	4,467	ne.	24	nw.	22	14	9	7	4.1
Savannah	87	63	86	30.04	30.13	+ .07	74.2	— 1.3	92	17	82	46	22	66	26	69	68	86		6.52	+ 0.4	11	6,643	ne.	40	n.	22	15	4	11	4.9
Jacksonville	43	69	84	30.03	30.08	+ .05	76.3	— 1.4	94	18	84	49	21	69	27	71	70	87		16.23	+ 7.8	17	5,927	ne.	36	ne.	21	8	11	11	5.7
Florida Peninsula.							73.7	— 1.8												12.64	+ 4.9										
Jupiter	28	13	30	30.00	30.03	+ .02	77.8	— 2.2	87	19	83	61	22	72	17	74	73	84		18.09	+ 8.4	23	6,478	e.	32	n.	4	2	10	18	7.2
Key West	22	42	50	29.99	30.01	+ .02	80.6	— 1.4	88	*	85	69	8	77	14	76	73	80		9.11	+ 1.7	19	6,093	ne.	29	ne.	26	3	16	11	6.7
Tampa	36	60	67	30.00	30.04	+ .02	77.6	— 1.7	90	*	85	54	22	70	20	72	70	86		10.73	+ 4.6	16	5,342	ne.	36	n.	21	8	15	7	5.4
East Gulf States.							77.5	— 1.1												2.53	— 1.9										
Atlanta	1,131	92	126	28.98	30.15	+ .05	74.4	+ 2.9	95	16	84	50	22	64	30	64	59	64		0.14	— 3.8	2	6,084	ne.	28	ne.	29	15	10	5	3.9
Pensacola	56	78	90	30.00	30.06	+ .03	77.8	+ 0.3	94	16	86	57	22	70	26	70	67	74		2.35	— 2.4	10	7,747	ne.	42	ne.	11	13	11	6	4.5
Mobile	57	88	96	30.02	30.08	+ .05	77.9	+ 1.0	95	3	87	54	23	69	28	69	66	75		2.12	— 3.0	8	5,017	ne.	27	e.	13	13	10	7	4.9
Montgomery	221	100	107	29.86	30.09	+ .04	77.0	+ 1.5	96	2	88	53	22	66	34	67	63	68		1.06	— 1.9	5	4,457	e.	25	e.	29	21	4	5	3.1
Vicksburg	254	65	73	29.81	30.07	+ .02	77.7	+ 2.0	96	15	88	48	21	67	28	67	63	67		0.28	— 3.2	3	4,388	n.	31	e.	12	22	7	1	2.7
New Orleans	54	112	120	30.00	30.06	+ .05	79.4	+ 1.2	94	3	87	62	21	72	22	70	66	72		3.19	— 1.4	8	7,230	ne.	42	ne.	12	14	11	5	4.2
Port Eads	.....	27	....	.....	.....	.....	78.4	— 1.4	90	3	84	66	*	73	19	....	....	....		8.60	+ 2.6	15	10,126	ne.	72	ne.	11	6	12	12	5.8
West Gulf States.							78.0	+ 2.1												1.52	— 2.5										
Shreveport	249	77	84	29.82	30.08	+ .04	78.4	+ 2.0	100	4	90	47	22	66	35	66	60	63		1.11	— 2.6	4	4,381	se.	33	s.	8	21	3	6	2.7
Fort Smith	481	63	72	29.59	30.09	+ .07	76.3	+ 3.9	98	4	89	44	22	63	38	66	62	70		2.87	— 0.7	5	3,425	e.	19	se.	13	21	3	6	2.7
Little Rock	302	71	79	29.81	30.12	+ .06	77.9	+ 4.5	97	3	90	48	22	66	36	65	58	69		0.33	— 2.8	1	3,978	ne.	38	nw.	16	20	8	2	2.6
Corpus Christi	20	42	50	30.03	30.05	+ .04	78.9	+ 0.4	92	13	85	58	22	73	22	72	70	77		0.98	— 3.8	10	7,001	e.	31	e.	9	17	9	4	3.0
Galveston	42	85	96	30.03	30.07	+ .07	79.1	+ 0.4	91	4	84	63	21	74	16	73	70	76		2.40	— 3.8	10	7,431	e.	37	nw.	12	19	8	3	2.8
Palestine	510	54	61	29.54	30.07	+ .02	77.8	+ 2.4	100	4	90	49	22	66	38	66	62	67		1.36	— 1.9	5	4,239	ne.	26	ne.	13	16	9	5	4.0
San Antonio	704	95	104	29.33	30.05	+ .04	77.5	+ 0.8	95	12	88	54	23	67	32	66	61	64		1.61	— 1.8	8	5,285	n.	28	s.	5	15	5	10	4.3
Ohio Val. & Tenn.							72.1	+ 3.8												0.74	— 2.3										
Chattanooga	702	106	112	29.37	30.16	+ .07	74.4	+ 3.2	96	15	87	46	30	62	39	62	55	58		0.07	— 3.8	2	3,819	ne.	28	se.	11	15	15	0	3.4
Knoxville	1,004	80	88	29.12	30.16	+ .06	71.6	+ 1.7	95	16	85	45	*	58	38	62	58	68		1.92	— 0.8	2	3,869	ne.	35	sw.	16	26	1	3	1.3
Memphis	399	140	154	29.71	30.12	+ .05	78.0	+ 5.6	96	11	88	49	21	68	29	64	57	54		0.00	— 3.1	0	5,796	n.	25	n.	20	30	8	2	3.2
Nashville	545	128	134	29.57	30.14	+ .08	75.0	+ 4.6	96	16	88	44	22	62	40	61	53	53		0.19	— 3.9	2	3,626	e.	31	ne.	16	27	1	2	1.4
Lexington	989	75	122	29.11	30.14	+ .08	72.4	+ 4.7	96	14	85	40	21	60	32	59	50	50		0.80	— 1.8	3	4,961	e.	24	sw.	25	25	4	1	1.8
Louisville	525	114	136	29.60	30.16	+ .08	74.5	+ 5.1	100	14	88	42	21	60	38	60	52	55		0.75	— 2.1	2	4,396	n.	33	sw.	16	24	4	2	1.6
Indianapolis	823	154	164	29.31	30.17	+ .10	71.4	+ 6.2	96	12	85	41	21	58	36	58	49	51		0.79	— 2.2	3	4,649	sw.	66	w.	1	26	4	0	1.8
Cincinnati	628	152	157	29.51	30.17	+ .10	71.4	+ 3.2	97	15	84	42	*	58	35	60	54	62		0.64	— 1.8	4	3,221	se.	36	nw.	1	25	5	0	2.0
Columbus	824	87	100	29.30	30.16	+ .10	68.8	+ 3.6	97	*	84	37	21	54	41	58	53	65		0.82	— 1.8	3	3,435	ne.	44	nw.	1	22	6	2	2.4
Pittsburg	842	116	123	29.31	30.19	+ .11	67.6	+ 1.4	96	13	80	38	21	56	34	59	55	73		1.65	— 0.9	7	2,698	nw.	24	nw.	16	12	14	4	4.2
Parkersburg	638	77	84	29.52	30.19	+ .07	68.2	+ 2.4	99	15	84	37	22	52	44	58	53	70		0.46	— 2.7	3	2,739	n.	34	nw.	16	21	7	2	2.3
Lower Lake Region.							64.7	+ 2.4												0.74	— 2.2										
Buffalo	768	178	206	29.35	30.16	+ .11	63.2	+ 2.1	84	9	71	42	21	56	27	56	51	66		0.31	— 3.0	5	8,232	sw.	43	w.	18	13	13	4	4.4
Oswego	335	76	87	29.78	30.14	+ .08	61.0	+ 0.3	88	16	70	43	18	52	33	55	50	70		0.81	— 2.0	9	6,253	s.	28	n.	11	16	4	10	4.3
Rochester	523	81	90	29.59	30.15	+ .10	63.0	+ 1.8	94	10	74	36	28	52	31	55	50	68		0.46	— 1.9	7	4,676	sw.	22	sw.	18	14	7	9	4.8
Erie	714	92	102	29.42	30.17	+ .11	64.0	+ 1.1	88	9	72	40	28	56	24	56	51	66		0.54	— 3.4	4	6,222	s.	26	w.	26	20	7	3	4.1
Cleveland	762	190	201	29.36	30.16	+ .09	65.2	+ 2.3	87	9	74	39	21	56	29	57	51	64		0.66	— 2.8	4	8,364	se.	66	nw.	16	17	7	6	3.6
Sandusky	629	62	74	29.50	30.17	+ .11	67.4	+ 3.2	96	16	76	39	21	58	29	58	52	64		0.91	— 1.9	3	5,193	e.	52	nw.	16	17	8	5	3.3
Toledo	674	122	127	29.46	30.17	+ .12	67.4	+ 4.2	95	13	79	38	21	56	35	58	52	67		1.22	— 1.2	3	5,130	sw.	42	nw.	16	19	10	1	2.6
Detroit	730	160	166	29.40	30.17	+ .11	66.3	+ 3.9	93	10	76	39	21	57	26	57	52	68		1.02	— 1.4	4	5,080	sw.	27	w.	16	20	7	3	3.1
Upper Lake Region.							64.3	+ 5.8												1.04	— 1.8										
Alpena	609	61	65	29.49	30.14	+ .13	60.9	+ 4.7	94	9	70	34	21	51	35	56	54	83		0.87	— 2.9	10	5,490	w.	28	n.	16	14	13	3	3.7
Grand Haven	638	55	64	29.48	30.15	+ .12	64.8	+ 5.4	92	14	76	34	21	54	31	58	53	72		1.44	— 2.1	4	5,123	sw.	26	sw.	18	17	10	3	3.1
Marquette	734	67	95	29.30	30.08	+ .09	63.2	+ 7.8	94	9	73	39	20	54	34	57	54	80		1.97	— 1.9	10	7,527	nw.	36	sw.	28	15	10	5	4.0
Port Huron	639	70	108	29.50	30.18	+ .14	65.2	+ 5.0	95	10	76	34	21	55	36	56	52	74		0.51	— 2.1	7	6,447	s.	28	nw.	16	16	10	4	3.7
Sault Ste. Marie	634	58	65	29.46	30.12	+ .11	59.1	+ 3.1	91	9	69	35	21	49	34	53	51	83		1.34	— 3.1	12	5,186	se.	44	nw.	16	18	9	5	3.9
Chicago	834	241	274	29.29	30.15	+ .11	69.5	+ 6.0	94	10	77	42	21	62	28	60	54	62		0.84	— 2.0	2	11,338	ne.	39	ne.	26	18	10	2	2.9
Milwaukee	671	106	149	29.44	30.15	+ .11	67.3	+ 6.3	95	9	76	40	20	58	30	59	54	68		1.48	— 1.4	5	6,070	se.	34	w.	16	12	9	4	4.6
Greenbay	617	49	57	29.48	30.14	+ .10	66.0	+ 6.3	94	9	77	36	20	56	30	57	53	72		3.21	+ 0.1	7	4,841	s.	35	sw.	13	16	9	5	4.0
Duluth	702	95	106	29.32	30.06	+ .08	62.6	+ 7.2	89	4	70	39	19	55	27	55	51	73		3.14	— 0.7	6	7,217	ne.	35	nw.	16	18	9	3	3.5
North Dakota.							65.6	+ 9.5												0.61	— 0.8										
Moorhead	935	54	60	29.00	30.00	+ .04	65.6	+ 9.9	97	3	80	28	17	52	46	56	51	71		0.94	— 1.2	2	8,022	se.	40	se.	3	20	8	2	3.0
Bismarck	1,674	16	29	28.24	29.98	+ .03	67.1	— 10.5	102	7	83	32	16	52	46	54	46	57		0.30	— 0.9	4	6,600	nw.	34	s.	14	24	4	2	2.7
Williston	1,875	15	31	28.00	29.94	— .01	64.0	+ 8.1	94	6	80	30	16	48	47	52	42	54		0.58	— 0.2	3	6,017	se.	36	nw.	8	24	6	0	2.8
Upper Miss. Valley.							72.1	+ 7.9												1.16	— 2.1										
Minneapolis	.....	99	....	.....	.....	.....	68.8	+ 6.5	91	*	79	39	20	58	29	....	....	....		1.57	— 1.0	9	.....	s.	....	....	...	16	7	7	....
St. Paul	837	114	134	29.18	30.07	+ .08	67.6	+ 7.9	90	5	78	38	20	57	31	59	55	71		1.33	— 1.7	8	4,894	se.	32	nw.	4	18	5	7	4.0
La Crosse	.....	70	78	.....	.....	.....	68.0	+ 7.6	92	9	79	33	20	57	33	....	....	....		1.64	— 2.6	5	4,577	s.	24	nw.	16	18	6	6	3.9
Davenport	599	71	79	29.48	30.11	+ .07	72.2	+ 8.0	95	13	84	39	20	61	34	61	54	61		1.52	— 1.7	5	4,077	sw.	30	sw.	15	21	5	4	2.8
Des Moines	867	84	88	29.19	30.10	+ .09	73.7	+ 10.3	98	1	86	38	20	61	41	61	56	63		1.56	— 1.6	5	4,600	sw.	28	sw.	9	23	5	2	2.0
Dubuque	698	49	56	29.38	30.11	+ .08	69.9	+ 7.5	93	8	81	38	20	59	34	60	55	68		3.19	— 0.9	7	4,052	s.	38	sw.	16	20	8	2	2.4
Keokuk	614	64	78	29.48	30.11	+ .08	74.4	+ 9.0	96	13	87	44	20	62	37	61	55	59		0.64	— 2.9	1	4,246	s.	24	s.	15	27	2	1	1.3
Cairo	359	87	98	29.75	30.13	+ .08	75.8	+ 6.1	96	11	87	46	21	64	31	64	59	65		0.53	— 2.0	3	3,810	s.	45	nw.	24	24	4	2	1.9

TABLE I.—*Climatological data for Weather Bureau Stations, September*, 1897—Continued.

Stations.	Elevation of instruments			Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.										Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.			Wind.					Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
	Barometer above sea level, feet.	Thermometers above ground.	Anemometers above ground.	Mean actual, 8 a. m. and 8 p. m. + 2.	Mean reduced.	Departure from normal.	Mean max. and min. + 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.					Total.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Maximum velocity. Direction.	Maximum velocity. Date.					
Up. Miss. Val.—Con																															
Springfield, Ill.	644	82	92	29.46	30.13	+ .07	73.2	+ 7.5	96	12	86	40	20	60	37	60	53	57	0.35	— 2.8	2	5,191	se.	34	ne.	1	25	4	1	1.8	
Hannibal	534	75	107	.....	.....	.....	73.4	.....	98	12	87	36	21	59	45	....	....	...	0.30	— 2.7	1	4,972	sw.	26	sw.	15	27	1	2	1.3	
St. Louis	567	110	210	29.54	30.14	+ .09	77.4	+ 8.2	98	12	89	45	20	66	32	63	55	52	0.09	— 3.0	1	5,248	s.	34	nw.	16	26	3	1	1.4	
Missouri Valley.							73.9	+ 9.0											0.92	— 1.5											
Columbia	.....	4	84	....	.....	.....	75.8	+ 7.8	102	3	92	35	21	59	46	....	....	....	0.51	— 3.1	2	4,454	se.	25	w.	15	21	8	1	2.4	
Kansas City	963	78	95	29.12	30.11	+ .09	76.8	+ 9.4	99	4	88	47	20	65	32	63	55	54	1.38	— 2.1	3	4,640	s.	24	s.	14	24	3	3	2.0	
Springfield, Mo.	1,324	164	103	28.75	30.11	+ .08	75.8	+ 8.1	95	3	87	44	21	64	32	61	52	51	0.37	— 3.7	2	6,140	se.	26	sw.	16	20	9	1	2.3	
Topeka	.....	81	....	.....	.....	.....	75.4	+ 8.5	98	5	89	46	21	62	38	....	....	....	1.16	— 1.7	4	.....	se.	.....	.....	.....	21	6	3	....	
Lincoln	1,199	74	84	28.81	30.05	.....	74.8	+ 8.7	100	1	88	44	20	62	39	62	56	61	1.71	+ 0.4	4	7,131	s.	34	n.	16	20	9	1	2.8	
Omaha	1,103	92	97	28.92	30.06	+ .05	75.2	+ 10.8	99	1	87	45	20	63	34	62	55	58	1.39	— 1.5	4	5,206	s.	29	nw.	16	21	8	1	2.1	
Sioux City	1,139	96	64	.....	.....	.....	71.8	+ 7.1	96	2	86	37	*	58	46	....	....	....	0.51	— 0.6	3	8,852	se.	38	s.	8	23	4	3	2.2	
Pierre	1,460	50	61	28.43	29.94	— .05	71.7	+ 9.5	102	7	86	37	17	57	42	59	53	60	0.14	— 0.8	3	6,440	se.	47	s.	6	18	8	4	3.4	
Huron	1,306	56	67	28.63	30.00	.00	69.4	— 10.3	99	7	85	33	17	54	44	58	52	66	1.14	— 0.3	7	8,971	se.	48	s.	3	18	9	3	3.4	
Yankton	1,234	52	58	28.74	30.01	+ .03	72.7	+ 9.8	97	5	86	37	17	60	41	59	52	58	0.89	— 2.0	4	6,851	s.	42	s.	8	21	7	2	2.6	
Northern Slope.							63.3	+ 5.1											0.38	— 0.6											
Havre	2,494	15	33	27.34	29.92	— .04	59.4	+ 4.8	86	22	76	23	16	43	46	49	39	56	0.66	— 0.5	6	6,291	w.	42	sw.	13	16	10	4	4.0	
Miles City	2,372	41	49	27.48	29.90	— .08	66.6	+ 6.6	98	6	82	30	16	51	48	52	40	47	0.12	— 0.6	1	4,585	w.	36	w.	3	17	10	3	3.4	
Helena	4,108	88	93	25.90	30.04	+ .05	57.8	+ 1.2	81	19	70	30	16	45	35	47	36	51	0.66	— 0.5	7	4,454	sw.	36	sw.	14	17	8	5	3.3	T.
Rapid City	3,251	46	50	26.68	29.94	— .03	68.8	+ 8.1	98	7	83	34	16	55	41	52	37	38	0.08	— 0.5	1	5,506	se.	40	sw.	14	14	9	7	4.2	
Cheyenne	6,105	58	60	24.16	30.00	+ .03	61.8	+ 5.1	86	7	76	32	17	48	42	48	35	47	0.41	— 0.5	5	5,610	nw.	27	sw.	22	15	12	3	4.2	T.
Lander	5,372	28	36	24.75	30.04	+ .06	58.2	+ 1.4	86	7	74	31	17	42	46	46	34	48	0.15	— 0.6	2	3,759	s.	34	sw.	3	17	8	5	3.7	
North Platte	2,826	43	52	27.16	30.02	+ .02	70.8	+ 8.4	94	6	84	42	17	57	39	58	53	64	0.59	— 0.7	7	7,132	s.	41	s.	1	20	7	3	3.0	
Middle Slope.							72.3	+ 5.6											0.91	— 0.9											
Denver	5,290	79	151	24.85	30.02	+ .06	66.4	+ 5.0	93	2	80	40	16	52	38	52	41	48	0.44	— 0.3	3	4,887	s.	33	nw.	8	5	21	4	5.3	
Pueblo	4,713	74	81	25.37	29.99	+ .04	68.4	+ 4.7	95	1	84	41	17	53	41	52	40	45	0.77	+ 0.4	3	4,397	nw.	41	n.	15	14	11	5	4.6	
Concordia	1,398	42	47	28.60	30.05	+ .01	75.3	+ 8.4	100	1	90	44	20	61	41	61	54	57	1.20	— 1.2	5	4,955	s.	26	s.	8	20	7	3	2.9	
Dodge City	2,504	44	52	27.50	30.04	+ .07	73.2	+ 5.8	94	23	87	46	16	59	39	59	51	58	0.60	— 0.8	5	8,024	s.	40	s.	8	24	5	1	2.7	
Wichita	1,351	78	85	28.68	30.08	+ .09	75.2	+ 6.2	96	5	88	50	21	62	38	62	55	57	1.22	— 1.5	3	4,896	s.	24	n.	16	19	9	2	2.1	
Oklahoma	1,218	54	53	28.84	30.10	+ .10	75.2	+ 3.6	96	5	87	49	21	63	32	62	56	63	1.22	— 1.7	5	5,777	s.	33	se.	14	23	4	3	2.1	
Southern Slope.							72.0	0.0											1.81	— 0.5											
Abilene	1,749	47	54	28.31	30.10	+ .09	74.7	+ 0.8	95	5	86	52	17	63	34	63	57	65	2.89	+ 0.4	11	5,169	se.	30	ne.	16	13	11	6	4.1	
Amarillo	3,691	54	61	26.40	30.08	+ .08	69.2	— 0.7	88	6	81	42	17	57	30	57	50	60	0.73	— 1.4	3	10,057	s.	40	n.	16	16	10	4	3.9	
Southern Plateau.							75.7	+ 1.2											2.27	+ 1.4											
El Paso	3,767	10	110	26.27	30.01	+ .08	72.0	— 1.4	89	1	82	54	28	62	30	60	54	63	2.73	+ 1.6	10	5,714	e.	38	w.	8	13	9	8	4.6	
Santa Fe	6,998	47	50	23.44	30.06	+ .07	61.9	+ 2.2	81	1	72	43	17	52	26	52	45	62	2.49	+ 1.0	15	3,513	se.	27	e.	23	7	19	4	5.1	
Phœnix	1,076	47	57	28.73	29.82	.....	83.4	+ 2.6	102	5	96	65	14	71	36	68	61	54	3.67	+ 3.1	8	2,814	e.	26	sw.	28	19	9	2	3.4	
Yuma	139	16	50	29.67	29.81	.00	85.4	+ 1.2	105	5	79	62	14	72	39	67	56	44	0.20	0.0	4	.....	w.	28	se.	21	20	9	1	2.2	
Middle Plateau.							61.4	+ 0.1											0.20	— 0.3											
Carson City	4,730	82	92	25.29	29.98	.....	58.7	— 1.5	83	24	74	31	8	44	39	46	32	42	T.	— 0.3	0	5,156	w.	40	s.	25	17	12	1	2.9	
Winnemucca	4,340	59	70	25.63	29.93	— .02	59.4	— 0.4	88	20	77	26	29	42	50	45	25	30	0.12	— 0.2	2	.....	w.	....	.....	...	18	6	6	3.1	
Salt Lake City	4,344	83	90	25.68	29.98	+ .02	66.2	+ 2.3	88	1	78	43	9	54	38	54	43	47	0.48	— 0.4	5	4,637	se.	30	sw.	7	15	7	8	4.5	
Northern Plateau.							59.1	+ 0.1											1.17	+ 0.3											
Baker City	3,470	49	55	26.48	30.03	+ .05	56.4	0.0	86	19	69	35	16	44	41	46	36	55	1.11	+ 0.4	9	4,031	s.	35	sw.	20	12	8	10	5.1	
Idaho Falls	4,742	10	56	25.30	30.01	+ .02	59.0	+ 2.7	86	7	76	30	9	42	47	49	40	57	0.55	— 0.2	3	7,141	s.	50	sw.	13	14	10	6	4.0	
Spokane	1,943	99	107	28.01	30.03	+ .05	57.8	— 0.1	88	21	70	37	16	46	39	50	42	62	1.57	+ 0.6	11	3,203	ne.	25	se.	5	14	2	14	5.0	
Walla Walla	1,018	65	73	28.94	30.01	+ .01	63.2	— 2.1	91	21	74	41	16	52	35	54	47	58	1.44	+ 0.5	8	3,221	n.	19	n.	2	16	12	2	3.5	
N. Pac. Coast Reg.							57.0	0.8											2.35	— 1.1											
Fort Canby	179	10	34	29.85	30.04	+ .03	57.1	— 0.8	81	17	62	47	28	52	21	52	50	84	3.63	— 0.1	12	8,090	n.	48	s.	29	10	9	11	5.2	
Port Angeles	29	47	62	.....	.....	.....	52.8	+ 0.1	75	18	60	36	28	46	26	...	....	....	1.32	— 0.5	8	3,302	nw.	20	w.	13	15	6	9	4.5	
Pysht c	.....	5	....	.....	.....	.....	52.0	.....	69	18	58	37	28	46	26	....	....	....	1.54	— 3.2	7	.....	w.	....	.....	...	14	4	9	....	
Seattle	119	100	108	29.93	30.06	.....	57.0	.....	77	19	64	43	29	50	25	54	51	81	2.04	.....	11	2,656	se.	20	s.	6	18	12	10	5.6	
Tacoma	213	....	....	.....	.....	.....	56.0	....	84	18	64	40	29	48	36	..	....	....	1.41	.....	12	3,027	n.	29	sw.	3	10	7	13	5.8	
Tatoosh Island	86	7	21	29.97	30.07	+ .07	53.5	— 0.8	68	18	58	45	28	50	15	51	49	85	2.16	— 4.4	7	6,844	w.	49	e.	18	9	4	17	6.5	
Astoria	.....	39	60	.....	.....	.....	58.0	— 1.9	78	17	64	45	15	52	23	....	....	....	3.43	— 0.9	11	.....	sw.	....	.....	...	12	9	9	....	
Portland, Oreg	153	203	213	29.87	30.03	.00	60.0	— 1.5	89	18	69	42	28	51	30	54	49	72	2.79	+ 1.0	11	4,901	nw.	45	s.	2	10	10	10	4.9	
Roseburg	521	56	67	29.46	30.02	— .02	60.7	0.0	92	18	72	40	29	49	45	53	48	70	1.60	+ 0.5	10	2,387	nw.	18	sw.	2	11	9	10	5.1	
Mid. Pac. C'st Reg.							63.1	— 0.3											0.36	— 0.3											
Eureka	64	60	69	29.99	30.05	+ .05	55.2	+ 0.8	82	17	61	45	10	49	30	52	50	88	1.05	— 0.2	9	3,719	nw.	33	nw.	10	11	11	8	5.0	
Redbluff	334	54	58	29.59	29.93	+ .02	72.6	— 0.6	99	17	85	47	29	60	35	56	42	39	0.03	— 0.6	3	4,027	se.	25	nw.	9	22	7	1	2.1	
Sacramento	71	106	117	29.86	29.93	— .01	69.6	— 0.3	97	17	83	48	29	56	37	58	49	54	0.16	— 0.2	1	5,336	sw.	27	sw.	6	21	7	2	2.4	
San Francisco	153	161	167	29.84	30.00	+ .05	60.8	— 0.9	92	16	68	50	30	54	31	55	52	81	0.10	— 0.2	2	8,462	w.	37	w.	19	16	10	4	3.7	
Point Reyes Light	.....	12	....	.....	.....	.....	57.1	— 0.3	92	16	63	48	*	51	40	....	....	....	0.47	— 0.5	3	.....	nw.	....	.....	...	13	9	8	....	
S. Pac. Coast Reg.							70.4	— 0.6											T.	— 0.1											
Fresno	332	67	70	29.54	29.89	+ .01	72.8	— 2.8	98	24	88	47	30	57	38	57	43	41	T.	— 0.2	0	4,299	nw.	20	nw.	7	24	5	1	1.5	
Los Angeles	330	74	82	29.59	29.94	+ .03	70.3	+ 0.6	97	21	82	52	13	59	32	62	58	76	0.00	— 0.1	0	3,041	w.	15	s.	30	10	20	0	3.5	
San Diego	87	59	70	29.83	29.93	+ .01	68.1	+ 0.3	83	21	73	58	13	63	17	62	59	77	T.	— 0.1	0	4,154	nw.	24	nw.	18	28	1	1	1.7	
San Luis Obispo	201	10	46	29.77	29.99	.....	64.1	.....	95	23	78	42	13	50	38	55	52	74	0.07	.....	1	3,184	s.	20	n.	8	19	10	1	2.9	

NOTE.—The data at stations having no departures are not used in computing the district averages. Letters of the alphabet denote number of days missing from the record. * Two or more dates. † Received too late to be considered in departures, etc.

TABLE II.—*Meteorological record of voluntary and other cooperating observers, September, 1897.*

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Alabama.	°	°	°	*Ins.*	*Ins.*
Alco †	93	42	75.2	0.29	
Ashville †	101	43	74.7	0.30	
Bermuda †	92	50	74.8	0.65	
Birmingham	100	50	78.0	1.15	
Brewton †	95	41	75.3	T.	
Bridgeport †	.....	.....	.....	0.10	
Citronelle †	92	55	77.4	2.09	
Clanton †	92	46	74.9	0.70	
Daphne †	94	47	76.4	3.57	
Decatur †	97	39	73.7	0.00	
Demopolis	.....	.....	.....	0.25	
Elba †	94	44	74.6	1.32	
Eufaula *a* †	97	49	76.6	1.52	
Evergreen	92	47	75.4	0.40	
Florence *a* †	.....	.....	.....	0.00	
Florence *b* †	97	41	75.9	0.00	
Fort Deposit †	94	53	76.8	0.35	
Gadsden	100	45	75.9	0.04	
Goodwater †	102	47	77.2	0.94	
Greensboro †	96	49	77.0	0.74	
Hamilton	100	33	74.7	T.	
Healing Springs †	96	43	74.6	0.57	
Highland Home †	91	49	76.4	1.24	
Jasper	.....	.....	.....	0.44	
Livingston	97	44	74.7	0.10	
Lock No. 4	99	46	75.5	0.73	
Madison Station †	99	41	74.4	0.00	
Maple Grove	95	40	70.6	1.35	
Marion †	95	50	77.5	0.80	
Mount Willing †	94	50	75.8	2.00	
Newbern †	93	49	77.0	0.52	
Newburg †	100	44	76.0	T.	
Newton †	94	48	72.8	1.34	
Oneonta	96	39	72.8	0.12	
Opelika †	97	51	75.7	0.96	
Oxanna †	97	44	73.5	0.00	
Pineapple	98	44	75.6	0.40	
Pushmataha †	96	47	76.6	1.22	
Riverton †	96	44	77.2	0.00	
Rockmills †	91	45	72.4	0.00	
Scottsboro †	99	39	73.4	0.07	
Selma †	94	51	76.8	0.08	
Talladega *1	98	47	76.7	0.24	
Thomasville	97	48	76.7	0.06	
Tuscaloosa †	95	52	76.6	0.31	
Tuscumbia	98	42	75.6	0.00	
Union †	99	43	78.6	0.82	
Union Springs †	94	51	76.0	0.80	
Uniontown † [6]	96	54	78.4	1.70	
Valleyhead	94	40	73.1	0.15	
Warrior	.....	.....	.....	0.00	
Wetumpka	94	50	76.4	1.78	
Wilsonville †	.....	.....	.....	0.00	
Arizona.					
Antelope Valley	.....	.....	.....	1.67	
Benson *8	94	67	79.4	2.10	
Bisbee †	84	56	70.2	3.14	
Buckeye †	106	60	83.2	1.01	
Buttes	.....	.....	.....	0.90	
Calabasas	90	57	73.4	2.17	
Casa Grande *8	101	75	85.4	.....	
Cedar Springs	95	56	73.2	2.08	
Congress	94	64	79.4	1.58	
Dragoon Summit *3	89	65	77.5	2.27	
Dudleyville	95	60	80.2	0.98	
Farleys Camp †	100	61	79.2	4.57	
Flagstaff †	82	48	63.1	0.42	
Fort Apache	89	49	68.4	3.41	
Fort Defiance	84	42	62.2	3.06	
Fort Grant †	92	57	72.6	4.75	
Fort Huachuca †	92	55	70.9	3.59	
Gilabend *8	105	73	88.7	T.	
Gisela	96	55	75.9	2.91	
Glendale	101	58	81.6	1.79	
Holbrook †	88	48	67.8	1.58	
Jerome	86	57	69.8	3.00	
Lochiel *1	84 [3]	59	70.2 [3]	4.32	
Maricopa *8	110	74	87.1	1.27	
Mesa †	104	64	82.8	1.35	
Mount Huachuca	90	51	69.6	5.66	
Music Mountain	101	49	77.0	0.46	
Natural Bridge	.....	.....	.....	7.10	
Oracle †	89	61	74.3	3.52	
Oro	.....	.....	.....	3.66	
Oro Blanco	94	57	73.8	2.16	
Pantano *8	89	62	75.5	3.56	
Parker	110	53	84.4	1.96	
Payson	.....	.....	.....	4.76	
Peoria †	99	65	82.4	1.75	
Phœnix	99	61	81.0	1.58	
Pinal Ranch	.....	.....	.....	2.12	
St. Helena Ranch	.....	.....	.....	4.31	
San Carlos †	102	58	79.2	0.52	
San Simon *8	88	66	74.5	.....	
Signal †	103	57	81.3	0.85	
Snowflake	83	46	65.2	2.00	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Arizona—Cont'd.	°	°	°	*Ins.*	*Ins.*
Strawberry	82	44	63.6	4.34	
Sulphur Spring Valley	.....	.....	.....	0.83	
Texas Hill *8	110	70	90.1	0.00	
Tombstone	85	58	72.1	5.23	
Tuba	94	43	68.0	1.34	
Tucson *c* †	99	62	80.2	2.71	
Walnut Grove	.....	.....	.....	2.24	
Whipple Barracks †	87	40	63.0	3.47	
White Hills	99	60	80.4	0.25	
Willcox *3	96	65	73.4	1.15	
Williams	84	37	61.2	3.86	
Arkansas.					
Amity	100	39 [c]	76.2	0.79	
Arkansas City †	.....	.....	.....	0.00	
Beebranch † [1]	102 [2]	42 [2]	77.2 [2]	0.50	
Blackton	.....	.....	.....	T.	
Blanchard Springs †	99	37	76.0	0.83	
Brinkley	100	46	76.6	0.30	
Camden *a* †	.....	.....	.....	0.95	
Camden *b* †	99	43	77.4	0.97	
Canton *1	102	43	74.9	.....	
Conway	101	37	75.8	0.02	
Corning †	102	34	74.0	T.	
Dallas	98	43	75.0	1.40	
Dardanelle	.....	.....	.....	0.40	
Elon †	101	40	75.4	0.47	
Fayetteville †	100	35	74.6	1.62	
Forrest	98	40	76.6	T.	
Fulton †	.....	.....	.....	1.29	
Hardy	100	41	76.2	0.00	
Helena *a* †	.....	.....	.....	0.00	
Helena *b*	102	46	78.4	0.00	
Hot Springs *a*	103	42	79.7	1.32	
Hot Springs *b*	.....	.....	.....	1.06	
Hot Springs (near)	.....	.....	.....	1.19	
Jonesboro	97	38	72.3	0.00	
Keesees Ferry †	108	35	77.2	T.	
Lacrosse †	99	39	75.4	T.	
Lonoke *1	96	40	75.6	0.00	
Luna Landing *6	94 [d]	43 [d]	74.6 [d]	0.00	
Lutherville *1	101	48	80.8	.....	
Magnolia	100	43	79.2	0.83	
Malvern †	105	36	77.2	0.45	
Marianna *1	96	48	76.6	.....	
Marvell	98	42	77.6	0.00	
Moore	.....	.....	.....	0.32	
Mossville	97	.....	.....	0.14	
Mount Nebo †	93	50	76.0	0.74	
New Gascony *1	94	47	78.2	T.	
Newport *a* †	.....	.....	.....	0.00	
Newport *b* †	98	37	74.4	0.00	
Newport *c* †	101	33	75.5	0.00	
Oregon *1	96	38	73.6	.....	
Osceola †	95	43	74.6	0.00	
Ozark †	102	49	79.6	2.27	
Paragould	97	40	77.2	0.00	
Picayune †	100	45	78.3	2.83	
Pinebluff †	102	41	78.6	0.22	
Pocahontas †	98	38	74.8	0.00	
Powell *† [1]	102	42	74.9	0.00	
Prescott	104	45	79.5	1.15	
Rison	102	40	76.5	0.57	
Russellville	99	38	76.2	0.86	
Silver Springs †	95	36	72.0	0.46	
Spielerville	101	47	78.1	0.87	
Stamps	102	40	78.7	1.30	
Stuttgart †	103	37	78.4	0.01	
Texarkana †	105	40	79.1	0.90	
Warren †	103	41	77.8	0.38	
Washington *† [1]	100	50	79.1	1.38	
Wiggs *1	100	42	78.7	1.24	
Winslow	93	50	75.2	1.58	
Witts Springs †	97	37	75.2	0.57	
California.					
Arlington Heights	100	46	71.9	0.06	
Athlone *5	102	58	75.5	0.00	
Azusa	.....	.....	.....	0.45	
Ballast Point L. H	.....	.....	.....	0.00	
Bear Valley	.....	.....	.....	0.72	
Berkeley	89	48	62.6	0.20	
Bishop †	85 [c]	33 [c]	60.6 [c]	0.09	
Boca *8	82	22	49.2	T.	
Bodie †	74	15	46.4	0.39	
Bowmans Dam *† [1]	79	38	54.5	0.61	
Caliente *8	98	52	73.7	0.00	
Calloway Canal *† [5]	102	54	77.2	0.00	
Campbell	94	38	62.9	0.05	
Cape Mendocino L. H	.....	.....	.....	0.80	
Castle Pinckney *1	91	56	66.4	0.21	
Cedarville †	82	32	57.8	0.21	
Centerville *1	100	56	67.2	T.	
Chico *8	100	55	73.2	0.02	
Cisco *8	73	32	50.5	.....	
Claremont †	98	50	71.7	0.27	
Corning *8	98	49	71.5	0.00	
Craftonville	100	42	71.2	0.79	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
California—Cont'd.	°	°	°	*Ins.*	*Ins.*
Crescent City †	80	40	55.5	2.54	
Crescent City L. H	.....	.....	.....	2.50	
Daunt	.....	.....	.....	0.10	
Delano *8	98	60	75.5	0.00	
Delta *8	94	40	63.9	0.00	
Descanso *5	86	24	61.4	0.56	
Drytown	96	38	67.6	0.30	
Dunnigan *8	96	43	73.1	0.08	
Durham *1	92	46	65.6	0.30	
East Brother L. H	.....	.....	.....	0.00	
Edmanton *1	86	34	55.1	0.70	
Elsinore	99	44	73.8	0.26	
Escondido	105	44	70.9	T.	
Fallbrook *1	100	52	69.1	T.	
Fordyce Dam	.....	.....	.....	1.42	
Fort Bragg †	.....	.....	.....	1.15	
Fort Ross	84	45	58.5	1.05	
Georgetown	87	44	65.6	0.30	
Goshen *8	99	49	72.2	.....	
Grand Island *5	98	48	72.0	0.19	
Grass Valley	.....	.....	.....	0.51	
Greenville †	90	27	57.2	1.48	
Healdsburg *1	98	49	64.5	0.10	
Hollister	98	36	64.4	0.06	
Humboldt L. H	.....	.....	.....	1.40	
Indio *8	105	58	73.2	2.10	
Iowa Hill *1	86	47	62.8	0.45	
Jackson	86	42	63.4	0.19	
Jolon	.....	.....	.....	0.15	
Keene *8	92	46	65.8	0.00	
Kennedy Gold Mine	93	42	67.5	0.37	
King City *8	100	46	66.4	0.00	
Kingsburg *8	95	55	74.5	0.00	
Lagrange *5	101	49	74.0	T.	
Laporte *† [1]	76	35	52.3	1.26	
Las Fuentes Ranch	.....	.....	.....	0.24	
Lemoore *a* *8	97	50	72.2	0.00	
Lick Observatory	80	39	60.4	0.07	
Lime Kiln	104	47	75.2	0.00	
Lime Point L. H	.....	.....	.....	0.26	
Lodi	95	44	68.6	0.16	
Los Gatos *b*	90	40	63.8	0.06	
Lytton Springs	95	45	66.9	0.10	
McMullin *1	100	46	73.8	.....	
Malakoff Mine *1	82	45	63.1	0.57	
Mammoth Tank *8	108	75	90.6	T.	
Manzana	90	40	67.0	0.00	
Mare Island L. H	.....	.....	.....	0.31	
Merced *8	100	52	72.9	0.00	
Mills College	.....	.....	.....	0.08	
Milton (near) *1	98	53	71.8	0.18	
Modesto *8	105	53	75.5	0.00	
Mokelumne Hill *3	.....	50	65.4	0.13	
Mohave *8	98	57	72.3	0.00	
Monterey *8	79	48	60.1	0.12	
Mount Frazier	.....	.....	.....	0.33	3.0
Mutah Flat	.....	.....	.....	0.00	
Napa *b*	100	39	65.6	0.26	
Needles	104	62	85.0	0.40	
Nevada City	83	39	61.0	0.60	
Newhall *8	103	50	71.9	0.00	
North Ontario	92	48	70.2	0.00	
North San Juan *1	92	44	63.1	0.74	
Oakland *a*	88	49	63.0	0.16	
Ogilby *8	107	80	95.5	0.00	
Oleta *1	91	40	62.5	0.12	
Orangevale †	95	47	70.4	0.00	
Orland *8	102	56	77.0	0.10	
Oroville *b*	102	50	75.4	0.80	
Palermo †	98	45	71.8	0.33	
Paso Robles *b*	93	42	66.5	0.03	
Peachland *1	90	42	61.7	0.13	
Piedras Blancas L. H	.....	.....	.....	0.20	
Pigeon Point	.....	.....	.....	0.30	
Pilot Creek	.....	.....	.....	0.38	
Pine Crest	93	51	67.6	0.45	
Placerville	87	36	61.8	0.13	
Point Ano Nuevo L. H	.....	.....	.....	0.45	
Point Arena L. H	.....	.....	.....	0.57	
Point Bonita L. H	.....	.....	.....	0.28	
Point Conception L. H	.....	.....	.....	0.25	
Point Fermin L. H	.....	.....	.....	0.00	
Point George L. H	.....	.....	.....	0.50	
Point Hueneme L. H	.....	.....	.....	0.00	
Point Lobos	85	50	57.9	0.09	
Point Loma L. H	.....	.....	.....	0.00	
Point Montara L. H	.....	.....	.....	0.27	
Point Pinos L. H	.....	.....	.....	0.21	
Point Reyes L. H	.....	.....	.....	0.47	
Point Sur L. H	.....	.....	.....	0.70	
Pomona (near)	101	49	72.1	0.22	
Poway *3	99	61	68.6	0.02	
Quincy †	82	31	58.1	0.63	
Ravenna *8	103	53	74.0	0.00	
Redding *b* †	96	44	71.8	0.15	
Represa	90	48	69.0	0.10	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
California—Cont'd.	°	°	°	*Ins.*	*Ins.*
Riovista	95	50	70.7	0.11	
Roe Island L. H	.....	.....	.....	0.10	
Rosewood	97	36	67.6	0.03	
Sacramento*a*	92	46	67.9	0.14	
Salinas*[a]*	81	50	64.1	0.55	
Salton*[a]*	117	78	99.0	0.05	
San Bernardino†	99	44	71.3	0.13	
San Jacinto	93	38	69.4	0.16	
San Leandro*[1]*	95	54	65.2	0.10	
San Luis L. H	.....	.....	.....	0.15	
San Mateo*[a]*	92	54	66.4	0.00	
San Miguel*[a]*	96	43	69.8	0.04	
San Miguel Island	74	52	61.6	0.18	
Santa Ana*[b]*	95	62	75.4	0.00	
Santa Barbara *a*	93	52	67.0	0.00	
Santa Barbara L. H	.....	.....	.....	0.13	
Santa Clara *a*	.....	.....	.....	0.08	
Santa Cruz*b*†	93	39	62.1	0.17	
Santa Cruz L. H	.....	.....	.....	0.00	
Santa Maria	87	44	64.1	0.10	
Santa Monica*[a]*	89	61	72.2	0.00	
Santa Paula	91	45	65.2	0.45	
Santa Rosa*[a]*	90	43	65.5	0.10	
Saticoy	.....	.....	.....	0.62	
Shasta	.....	.....	.....	0.07	
Sierra Madre	96	50	70.8	0.42	
Sneddens Ranch*[1]*	78	10	48.4	0.14	
S. E. Farallone L. H	.....	.....	.....	0.00	
Stanford University	93	44	65.6	0.00	
Stockton *a*	93	47	68.1	0.03	
Summerdale†	81	38	59.2	0.03	
Susanville†	83	36	61.4	0.55	
Sutter Creek*[b]*	91	34	63.1	T.	
Tehama*[a]*	98	56	74.0	0.13	
Templeton*[a]*	98	40	65.4	0.00	
Trinidad L. H	.....	.....	.....	1.06	
Truckee*[a]*	80	28	53.8	T.	
Tulare *b*	.....	.....	.....	0.66	
Tulare *c*	100	40	71.2	0.58	
Turlock†	101	37	69.4	T.	
Ukiah†	91	40	66.5	.....	
Upper Lake	97	37	66.0	0.08	
Upper Mattole*[1]*	96	40	57.9	0.91	
Vacaville *a*[1]	98	53	71.3	0.07	
Ventura†	91	44	63.1	0.50	
Volcano Springs*[a]*	113	59	82.2	0.00	
Walnut Creek	96	50	70.2	0.00	
West Palmdale*[1]*	103	49	70.4	T.	
Westpoint	.....	.....	.....	0.12	
Wheatland†	93	45	68.9	0.12	
Williams*[a]*	96	48	72.3	T.	
Wilmington*[b]*	98	57	74.3	0.00	
Wire Bridge*[b]*	95	47	70.4	0.29	
Yerba Buena L. H	.....	.....	.....	0.20	
Yreka†	91	32	60.2	0.12	
Yuba City*[b]*	92	56	72.4	0.23	
Colorado.					
Alma†	67	25	42.5	0.81	T.
Antlers†	90	43	64.8	1.37	
Arkins	.....	.....	.....	0.84	
Boulder	85	42	66.8	0.86	
Boxelder	.....	.....	.....	0.68	
Breckenridge†	77	24	47.4	1.16	
Canyon†	96	42	68.5	0.86	
Castlerock	89	32	64.9	0.24	
Cheyenne Wells	96	37	69.0	0.92	T.
Collbran	.....	.....	.....	2.63	
Colorado Springs†	87	37	62.4	0.74	
Crook	98	31	67.5	0.62	
Delta	98	41	66.7	2.47	
Dumont†	.....	.....	.....	1.42	
Durango	84	41	61.4	3.55	
Fleming	.....	.....	.....	0.45	T.
Fort Collins†	90	34	63.7	0.75	
Fort Morgan*[h]*	93	34	64.6	0.62	
Fox	.....	.....	.....	0.50	
Garnett	80	32	56.2	0.86	
Gleneyrie†	81	36	61.1	0.89	
Goldhill*[1]*	88	32	60.6	4.21	
Grand Junction†	88	52	68.4	1.53	
Greeley†	90	32	64.0	0.29	
Gulch†	84	32	54.8	1.20	
Gunnison	82	30	54.8	1.50	
Hoehne	90	40	65.1	0.47	
Holly	.....	.....	.....	0.82	
Holyoke	.....	.....	.....	0.25	
Holyoke (near)	.....	.....	.....	0.50	
Hugo	.....	.....	.....	0.40	
Hugo (near)	85	34	60.2	0.42	
Husted†	93	34	63.6	0.70	T.
Lake Moraine†	70	28	49.7	1.83	5.5
Lamar†	98	44	73.1	0.51	
Laporte	.....	.....	.....	2.05	
Las Animas†	101	40	70.0	0.90	
Lay*[e]*	90	30	62.0	1.62	
Leadville (near)*†[1]	75	34	49.4	0.50	
Leroy†	94	34	68.3	0.41	T.
Longs Peak	75	38	51.9	0.95	T.
Loveland	.....	.....	.....	0.39	
Meeker†	90	32	59.7	2.33	
Millbrook†	90	32	57.2	1.55	
Minneapolis†	96	42	72.4	0.84	
Montrose†	87	40	63.1	2.45	
Moraine†	80	31	55.9	0.78	
Pagoda†	90	27	58.1	1.00	
Paonia†	.....	.....	.....	2.07	
Parachute†	88	38	64.0	2.55	
Pinkhamton	.....	.....	.....	0.55	
Rangely†	90	32	62.2	1.51	
Rico	78	33	53.1	5.80	
Rockyford	98	42	69.4	0.79	
Ruby	.....	.....	.....	4.17	
Saguache†	80	36	56.6	1.20	
San Luis†	90	35	59.8	1.95	
Santa Clara*[1]*	82	37	58.1	4.25	
Seibert†	.....	.....	.....	0.37	
Smoky Hill Mine	86	29	57.8	1.95	
Springfield	.....	.....	.....	1.45	
Stamford*[1]	74	30	45.1	3.39	
Steamboat Springs	88	26	57.8	0.20	
Surface Creek†	90	36	62.1	2.25	
Thon†	97	31	65.6	0.71	1.0
T. S. Ranch†	88	46	64.7	1.87	
Twin Lakes	.....	.....	.....	1.14	
Vilas	.....	.....	.....	0.28	
Walden	83	24	54.4	0.70	
Wallet†	.....	.....	.....	1.45	
Wray†	101	38	69.7	0.73	
Yuma	.....	.....	.....	T.	
Connecticut.					
Bridgeport	94	37	64.2	1.97	
Canton†	88	30	59.8	2.09	
Colchester	90	35	61.2	2.85	
Hartford *b*	.....	.....	.....	2.33	
Middletown	93	37	63.5	2.44	
New London†	89	36	62.3	3.74	
Norwalk	90	32	61.4	2.24	
Southington*[1]	88	40	61.3	2.65	
Storrs	89	32	60.0	1.39	
Voluntown†	90	30	60.2	1.82	
Waterbury	90	37	62.6	2.18	
West Cornwall†	84	36	58.7	2.85	
Windsor	87	36	60.8	1.56	
Delaware.					
Milford	97	45	71.4	2.56	
Millsboro	94	42	67.2	1.51	
Newark	94	40	66.0	0.99	
Seaford	95	42	69.0	1.16	
District of Columbia.					
Distributing Reservoir*[b]*	90	44	68.6	0.92	
Receiving Reservoir*[b]*	89	45	68.3	0.98	
West Washington	96	37	67.0	1.40	
Florida.					
Amelia†	89	49	75.4	20.88	
Archer†	93	48	76.0	8.78	
Bartow	95	53	78.6	11.94	
Boca Raton†	88	64	78.8	15.97	
Brooksville†	91	50	76.9	7.97	
Carrabelle†	93	52	76.9	10.60	
Clermont†	97	52	78.6	8.48	
De Funiak Springs	95	46	75.5	1.94	
Earnestville†	94	50	77.6	10.02	
Estero*[1]	86	64	77.2	9.53	
Eustis†	93	52	77.2	12.72	
Federal Point†	91	51	75.0	17.30	
Fort Meade†	92	53	77.2	16.36	
Frostproof	95	55	79.4	10.01	
Gainesville	92	48	75.7	7.29	
Grasmere†	91	50	77.4	10.96	
Haywood	94	52	76.9	2.26	
Huntington	99	52	76.4	12.29	
Kissimmee	94	54	78.7	15.20	
Lake Butler	95	47	76.2	6.36	
Lake City†	91	50	76.7	6.43	
Lemon City†	90	65	79.7	20.35	
Macclenny†	95	49	76.1	9.35	
Manatee	91	57	78.8	9.49	
Merritts Island	91	56	78.8	17.97	
Milton*[1]	92	52	75.8	2.43	
Mullet Key†	89	62	78.5	8.69	
Myers†	90	61	78.0	10.45	
New Smyrna	88	52	76.6	17.03	
Oakhill*[1]	92	55	79.7	.....	
Ocala*†[1]	92	49	75.8	9.83	
Orange City	95	55	77.4	14.03	
Orange Park	91	47	75.6	12.70	
Orlando†	90	52	75.0	15.77	
Oxford*†[1]	92	54	75.8	14.00	
Perry	.....	.....	.....	4.35	
Plant City	93	51	78.0	8.48	
Quincy	92[d]	49[d]	72.9[d]	8.51	
St. Francis†	94	50	76.4	12.87	
St. Francis Barracks	91	51	75.3	12.97	
Sebastian	91	54	78.5	23.01	
Tallahassee†	91	50	75.6	3.98	
Tarpon Springs†	96	52	78.9	9.15	
Wausau	98	48	77.0	2.13	
Georgia.					
Adairsville†[c]	97	43	73.2	0.18	
Alapaha	95	49	75.8	3.56	
Albany†	97	51	76.6	2.93	
Allentown†	95	49	74.6	0.73	
Americus†	96	49	76.0	1.34	
Athens†	97	50	72.7	0.64	
Bainbridge†	95	52	76.6	3.98	
Belleville	99	48	75.8	6.21	
Blakely†	92	52	76.4	3.23	
Brunswick	.....	.....	.....	11.94	
Camak†	96	46	74.3	4.33	
Canton†	.....	.....	.....	0.00	
Cartersville	95	45	72.4	0.25	
Cedartown	96	37	72.4	0.14	
Clayton†	93	39	68.6	0.47	
Columbus	.....	49	.....	0.70	
Covington	93	48	70.4	0.98	
Crescent	96	47	77.8	5.04	
Dahlonega†	95	42	71.1	0.65	
Diamond	91	40	69.0	0.09	
Eastman†	94	48	73.8	2.69	
Elberton†	97	54	73.0	1.45	
Fleming†	96	46	72.8	11.24	
Fort Gaines	93	50	75.2	3.29	
Franklin	94	49	74.8	0.11	
Gainesville	93	44	71.2	0.05	
Gillsville†[b]	100	43	74.5	0.00	
Greenbush	96	38	71.4	0.30	
Griffin†	94	52	73.3	0.00	
Hephzibah*†[e]	90	54	75.6	4.13	
Jesup	94	46	73.8	9.55	
Lagrange†	97	50	75.0	T.	
Louisville	99	47	74.7	3.37	
Lumpkin	93	52	76.4	0.82	
Macon†[b]	95	49	74.6	1.12	
Marietta	93	45	73.2	T.	
Marshallville†	93	54	76.7	1.16	
Milledgeville†	92	54	75.4	1.58	
Millen	99	48	74.9	3.53	
Morgan†[d]	94	47	74.4	4.05	
Newnan†	95	50	74.2	0.21	
Point Peter	96	48	71.0	2.05	
Poulan†	97	47	75.4	2.43	
Quitman†	95	48	74.8	2.39	
Ramsey	98	41	71.6	0.11	
Rome†	97	43	73.2	0.00	
Talbotton†	97	51	74.2	0.68	
Tallapoosa	94	44	74.0	0.10	
Thomasville†	95	51	76.8	2.99	
Toccoa†	91	43	67.1	0.50	
Union Point	94	42	70.4	2.10	
Washington†	101	46	74.8	5.94	
Waycross	95	48	73.6	7.48	
Waynesboro	95	40	73.2	3.51	
Westpoint†	94	50	73.8	0.70	
Whitesburg†	.....	.....	.....	0.45	
Idaho.					
Blackfoot†	87	30	59.0	0.66	
Bliss	93	32	62.2	0.32	
Boise Barracks†	89	35	61.6	1.04	
Burnside†	92	34	57.9	1.59	
Cœur d'Alene	87	32	56.6	.....	
Corral*[1]	82	30	56.3	0.20	
Downey	85	29	56.5	2.07	
Fort Sherman†	87	32	57.0	2.85	
Gimlet†	84	31	58.4	0.55	
Gray	85	36	58.4	.....	
Idaho City	96[f]	29[f]	55.7[f]	1.27	
Kootenai†	85	32	54.6	1.07	
Lakeview	71	38	54.4	2.08	
Lost River†	.....	.....	.....	0.66	
Marysville	85	20	55.8	0.80	
Murray†	81	30	53.1	2.25	
Oakley	88	28	60.8	1.20	
Ola†	84	35	59.8	1.04	
Paris	86	25	55.2	0.75	
Payette†	95	35	63.4	0.17	
Pollock†	89	37	60.3	2.23	
Rexburg	86	20	58.0	T.	T.
St. Maries	85	34	56.8	2.00	
Salubria	92	34	59.4	0.38	
Soldier†	84	22	54.6	0.13	
Swan Valley†	84	17	55.4	1.45	
Warren†	86	27	55.6	1.43	
Illinois.					
Albion†	100	40	73.2	0.74	
Alexander†	103	34	74.7	0.34	
Ashton*†[1]	98	45	70.3	1.03	
Atwood *a**†[g]	.....	28	63.0	0.64	
Atwood *b*	.....	.....	.....	0.83	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Illinois—Cont'd.	°	°	°	*Ins.*	*Ins.*
Aurora *a*	99	36	69.9	0.85	
Aurora *b*	98	35	69.2	0.89	
Bloomington†	100	34	73.1	2.08	
Bushnell†	101	39*	74.4*	1.16	
Cambridge	92	38	70.1	2.27	
Carlinville†	101	38	75.5	T.	
Carlyle				0.09	
Carrollton	94	39	72.4	0.59	
Charleston	94	37	71.6	1.67	
Chemung*†	95	31	65.2	1.18	
Chester				0.75	
Clare†	99	38	73.4	0.87	
Clearcreek†	99	29	70.2	0.95	
Cobden†	101	39	75.0	1.06	
Cordova	95	39	70.4	0.91	
Danville	98	32	70.1	0.15	
Decatur†	99	31	72.4	0.41	
Dixon†	99	34	70.8	2.00	
Dwight†	96	35	69.5	0.81	
East Peoria†	97	31	69.6	1.15	
Effingham†	97	38	72.9	0.25	
Evanston*[10]	96	42	68.3		
Fort Sheridan†	95	32	63.2	1.10	
Friendgrove*†[4]		44	71.8	1.10	
Galva†	98	35	71.5	2.46	
Glenwood*†[k]	101[k]	47[l]	70.2[c]	0.50	
Golconda†	100	36	74.5	0.20	
Grafton†				0.11	
Grayville	97	44	75.4	0.65	
Greenville†	98	38	74.3	0.18	
Griggsville†	98	38	74.2	0.46	
Halliday*[5]	96[d]	44[d]	75.2[d]	0.64	
Havana†	95	39	73.4	0.51	
Hillsboro†	102	36	75.1	T.	
Iron	97	35	72.6	0.79	
Joliet†	101	34	71.9	0.63	
Jordans Grove†	97	37	74.0	0.27	
Kankakee *a*†	89	43	67.1	0.20	
Kishwaukee	97	29	66.8	0.62	
Knoxville *a*	97	34	71.0	2.05	
Lagrange†	94	38	67.3	0.80	
Laharpe*[1]	100	33	73.8	1.39	
Lanark*†[1]	94	32	66.8	1.54	
Lexington	96	32	70.2	0.70	
Loami†				0.12	
Louisville†	97	37	72.8	0.24	
McLeansboro†	99	37	73.8	0.63	
Martinsville†	98	34	71.4	0.47	
Martinton†	99	29	70.6	0.29	
Mascoutah*[5]	97	37	74.5	1.00	
Mattoon*[1]	95	33	69.9	1.23	
Minonk†	97	32	70.0	1.90	
Monmouth†	99	35	71.6	2.78	
Morrisonville†	94	34	70.4	0.29	
Mount Carmel†				0.60	
Mount Pulaski	99	36	73.1	1.21	
Mount Vernon	100	38	73.2	0.41	
New Burnside†	99	36	75.0	1.18	
Olney *a*	99	36	72.5	0.71	
Oswego*[1]	96	40	67.1	0.86	
Ottawa†	99	37	70.5	1.89	
Palestine†	98	38	71.0	1.60	
Pana	98	34	72.6	1.04	
Paris	98	37	72.6	0.38	
Peoria *a*†				1.18	
Peoria *b*†	97	35	72.8	0.93	
Philo†	98	37	68.6	0.45	
Plumhill†	99	40	75.3	0.50	
Rantoul†	100	34	71.2	0.68	
Reynolds	97	35	71.0	2.99	
Riley†	95	35	68.8	1.15	
Robinson†	100	35	73.3	0.37	
Rockford	97	35	70.6	1.18	
Roundgrove†	99	34	70.8	2.16	
St. Charles*†[1]	95	40	66.9	0.60	
St. John*†[1]	100	43	75.3	1.50	
Scales Mound	93	31	67.6	3.07	
Streator†	98	39	71.6	1.10	
Sycamore†	94	32	68.6	0.44	
Tiskilwa*†[3]	96	43	67.8	2.62	
Tuscola†	98	30	70.7	0.71	
Walnut†	103	36	73.8	3.43	
Wheaton*[3]		42	64.4	1.10	
Winnebago†	94	32	68.7	1.01	
Zion†	92	30	66.8	2.90	
Indiana.					
Anderson†	96	32	68.8	0.63	
Angola*[1]	100	35	69.4	0.45	
Auburn	97	29	65.2	0.71	
Bloomington†	96	37	70.9	0.72	
Bluffton†	98	30	68.1	1.21	
Bright†	98	41	70.6	0.39	
Butlerville†	99	33	70.4	1.06	
Cambridge City†	97	29	65.9	1.86	
Columbia City*[1]	93	34	65.7	1.29	
Columbus†	98	32	68.6	0.89	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Indiana—Cont'd.	°	°	°	*Ins.*	*Ins.*
Connersville†	94	32	66.2	0.71	
Crawfordsville				0.03	
Delphi†	98	30	68.4	0.25	
Edwardsville*†[1]	96	46	75.5	0.50	
Evansville†	99	37	72.6	0.52	
Farmland†	94	33	66.8	0.65	
Fort Wayne	96	32	67.4	0.41	
Franklin*[1]	95	40	67.0	0.73	
Greencastle†	93	40	71.4	0.54	
Greensburg				0.37	
Hammond†	93	34	65.6	0.31	
Huntington	96	34	67.2	0.93	
Jasper†	100	35	72.5	0.70	
Jeffersonville	96	39	71.2	0.41	
Knightstown†				1.11	
Kokomo†	98	35[d]	68.1[d]	1.20*	
Lafayette†	98	31	70.6	0.05	
Laporte	98	29	65.3	0.33	
Logansport *b*†	94	33	66.5	0.28	
Madison†	96	37	70.7	0.26	
Marengo†	100	34	70.5	0.45	
Marion†	99	30	68.9	0.56	
Markle	94			1.13	
Mauzy†	93	30	68.1	0.80	
Michigan City*[10]	90	40	67.3		
Mount Vernon†	100	41	75.6	0.65	
Northfield†	96	38	67.6	0.20	
Princeton*[1]	100	39	70.1	0.25	
Richmond	95	30	68.0	0.90	
Rockport[4]	96	40	72.6	0.41	
Rockville†	98	35	71.3	0.13	
Salem				0.62	
Scottsburg	98	35	70.2	0.16	
Seymour	96	42	71.4	0.80	
Shelbyville	95	39	69.9	1.30	
South Bend†	98	32	69.8	0.23	
Syracuse†				0.20	
Terre Haute†	98	40	74.2	0.30	
Tipton	97	29	68.5	0.05	
Topeka†	94	31	66.9	0.14	
Valparaiso†	98	36	69.6	T.	
Vevay	97	39	72.2	T.	
Vincennes†	103	40	74.8	1.62	
Warsaw†	98	31	66.8	0.19	
Washington†	102	38	73.8	0.59	
Winamac	100	30	68.1	0.52	
Worthington†	98	35	71.2	0.94	
Indian Territory.					
Healdton†	95	48	74.2	2.34	
Lehigh†	108	36	76.0	0.25	
Purcell†	100	46	75.6	1.81	
South McAlester†				0.41	
Tahlequah	101	38	74.8	0.98	
Tulsa†				0.00	
Wagoner	101	41	76.5	T.	
Iowa.					
Adair				2.60	
Afton	98	34	72.0	2.72	
Algona*[1]	89	38	69.1	1.89	
Alta *a*†	94	35	70.4	0.20	
Amana†	94	33	69.4	3.25	
Ames *b*	99	32	71.7	3.24	
Ames (near)				1.85	
Atlantic†	98	30	71.4	2.31	
Atlantic (near)	96	39	73.2	3.30	
Audubon	96	31	70.2	2.00	
Belknap	98	35	74.6	0.65	
Belleplaine	96	31	67.2	2.23	
Bonaparte†	102	35	74.1	0.97	
Britt	93	36	68.8	1.96	
Carroll	98	30	71.9	0.81	
Cedar Falls	96	31	70.9	4.50	
Cedar Rapids†	96	37	70.9	3.78	
Centerville	100	35	73.3	2.85	
Chariton	96	38	73.7	1.20	
Charles City	92	20	67.7	2.75	
Clarinda†	97	42	73.2	1.55	
Clinton	93	33	69.0	2.00	
College Springs	101	39	74.9	1.99	
Corning†	96	33	73.4	0.79	
Council Bluffs	100	41	74.9	1.90	
Cresco†	90	33	67.2	3.26	
Decorah†	94	28	67.6	3.22	
Delaware*[3]	95	37	66.0	2.62	
Denison†	92	36	70.8	1.20	
Dows	94	28	69.5	2.57	
Eldora	103	29	72.4	4.15	
Elkader†	98	31	68.9	4.90	
Estherville	97	30	68.9	0.80	
Fairfield†	99	32	72.2	1.08	
Fayette†	96	28	68.7	4.34	
Fonda	99	35	72.0		
Forest City	95	34	69.4	1.53	
Fort Madison*†[1]	91	42	74.7	1.12	
Fredericksburg				4.34	
Galva†	97	32	71.7	0.21	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Iowa—Cont'd.	°	°	°	*Ins.*	*Ins.*
Gardengrove	98	34	71.8	1.16	
Gladbrook				3.38	
Glenwood†	99	38	75.2	2.03	
Grand Meadow*[1]	90	34	67.7	5.88	
Greene	96	30	70.2	3.28	
Greenfield	97	34	73.0	1.66	
Grinnell	96	36	69.7	2.55	
Grundy Center	95	31	69.4	4.41	
Guthrie Center	95	29	70.5	1.01	
Hampton	97	32	69.4	4.79	
Hawkeye				3.37	
Hedrick*[1]	97[c]	42	72.8*	1.12	
Hopeville†	97	38	73.6	3.32	
Humboldt†	97	27	70.4	0.70	
Independence†	94	32	67.6	2.70	
Indianola†	98	35	74.2	1.59	
Iowa City *b*	90	35	68.3		
Iowa Falls†	94	29	69.1	3.44	
Keosauqua	97	37	73.7	1.30	
Knoxville	98	37	73.2	3.01	
Lamoni	97	36	72.7	0.65	
Lansing	95	31	68.7	3.03	
Larchwood				3.05	
Larrabee†	96	31	70.8	0.42	
Leclaire				1.21	
Lemars[f]	95	30	69.0	0.00	
Lenox*[1]	96	44	72.6	1.32	
Logan†	96	34	71.6	0.08	
Malvern*[1]	106	31	71.1	1.47	
Maple Valley				0.37	
Maquoketa	92	32	67.6	2.11	
Marshall†	99	31	71.1	1.95	
Mason City	92	28	66.4	0.03	
Millman				2.00	
Monticello	97	33	68.4	2.11	
Mooar	100	31	71.7	0.64	
Mountayr†	99	38	73.0	1.22	
Mount Pleasant*[1]	92	43	72.4	0.78	
Mount Vernon *a*[1]*	94	37	69.7		
Mount Vernon *b*	92	34	68.7	5.09	
New Hampton	90	30	67.2	4.04	
Newton†	98	34	71.2	2.96	
North McGregor				6.63	
Northwood	91	30	66.6	2.70	
Odebolt				0.84	
Ogden	97	36	71.9	3.08	
Osage*†[3]		34	62.6	3.73	
Osceola	98	35	74.0	1.54	
Oskaloosa†	100	31	72.4	0.54	
Ottumwa	102	39	74.0	0.81	
Ovid†	101	33	75.2	0.69	
Plover	99	30	72.0	0.59	
Primghar	94	35	69.6	1.12	
Red Oak	97	34	72.4	0.92	
Rock Rapids	96	30	68.9	1.67	
Rockwell City	97	30	69.6	1.73	
Sac City†	97	29	70.4	T.	
St. Charles	98	37	73.6	2.04	
Seymour†	103	33	74.9	0.80	
Sibley	96	29	68.6	1.15	
Sidney	97	41	74.1	0.85	
Sigourney	99	34	72.6	1.68	
Spencer	94	27	69.0	0.71	
Spirit Lake†	100	35	72.0	0.49	
Stuart	96	39	71.5	1.48	
Thurman	98	37	72.6	1.89	
Toledo	96	30	70.2	1.90	
Villisca†	96	33	70.4	1.53	
Vinton*[1]	94	32	68.5	2.67	
Washington	98	34	71.1	1.33	
Washta				0.78	
Waterloo	97	32	69.9	2.77	
Waverly	92	34	69.6	3.08	
Webster City	93[d]	34	67.6[b]	1.68	
Westbend*†[1]	97	29	68.2	1.04	
West Branch	93	32	69.0	3.65	
Whitten*[1]	97	33	68.5	2.45	
Wilton Junction†	94	34	69.0	3.94	
Winterset†	97	32	71.0	2.46	
Kansas.					
Abilene†	101	46	75.3	1.47	
Achilles				2.82	
Altoona*†[3]	100	43	70.0	1.29	
Anthony				0.84	
Assaria	104	46	76.4	2.10	
Atchison†	99	44	75.4	0.93	
Augusta	98	47	74.6	0.82	
Baker	102	39	76.3	0.60	
Beloit†	102	41	74.7	0.45	
Burlington†	99	43	75.4	2.00	
Campbell	101	43	75.5	0.70	
Chanute	93*	42*	73.1*	1.51	
Colby†	97	40	69.4	3.19	
Columbus	104	37	75.1	0.15	
Coolidge†	97	39	71.5	0.35	
Cunningham†	100	44	73.8	2.19	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Kansas—Cont'd.	°	°	°	*Ins.*	*Ins.*
Dresden *b	100	45	76.4	1.92	
Elgin *1	98	47	75.1	1.30	
Ellinwood †	96	46	73.0	1.42	
Emporia †	95	47	73.4	2.50	
Englewood †	99	45	72.8	0.57	
Eskridge	99	42	76.0	0.98	
Eureka †	.....	.....	.....	1.17	
Eureka Ranch †	103	44	74.2	1.11	
Fall River	98	43	75.0	2.34	
Fort Riley †	100	46	76.8	0.77	
Fort Scott †	100	40	76.0	0.51	
Frankfort	102	37	73.4	0.75	
Garden City †	92	44	72.0	0.33	
Garfield	.....	.....	.....	0.67	
Gibson	101	42	73.6	1.74	
Girard *1	105	50	79.5	0.13	
Gove *† 1	96	46	73.6	3.42	
Grainfield *6	96	48	73.1	2.70	
Grenola	99	39	74.0	1.09	
Halstead	94	44	70.6	1.13	
Hays	100	44	73.8	2.66	
Horton	100	43	74.8	0.50	
Independence †	102	43	77.2	0.89	
Lakin †	100	43	71.8	0.60	
Lawrence	94	45	74.4	1.53	
Lebo †	99	45	75.0	2.75	
Macksville	96	42	72.2	1.52	
McPherson	99	44	71.8	1.58	
Manhattan *b*	104	44	75.9	0.53	
Manhattan *c*	102	40	74.5	0.53	
Marion †	97	48[d]	78.0[d]	0.70	
Meade †	99	40	74.5	1.45	
Medicine Lodge †	98	46	73.0	1.77	
Minneapolis †	102	44	74.6	1.01	
Morantown †	98	44	75.4	1.76	
Mounthope *1	95	50	74.6	1.15	
Ness City	99	46	74.8	1.10	
Newton	99	48	75.8	0.82	
Norton	101	40	69.6	1.23	
Norwich †	99	50	75.5	0.83	
Oberlin †	.....	.....	.....	2.94	
Olathe †	100	42	74.6	2.52	
Osage City †	98	41	72.4	2.11	
Osborne	.....	.....	.....	1.10	
Oswego	105	41	79.2	0.05	
Ottawa	98	39	73.9	2.42	
Phillipsburg	104	42	73.0	2.41	
Pleasant Dale	97	43	73.6	1.18	
Pratt	101	40	69.4	2.80	
Rome *† 1	95	49	73.4	1.31	
Russell	.....	.....	.....	1.04	
Salina †	102	44	74.9	1.15	
Scott City	98	39	71.2	0.98	
Sedan †	98	41	74.0	1.52	
Seneca	100	36	75.6	0.73	
Sharon Springs *1	106	44	75.3	1.75	
Toronto	101	38	74.4	1.90	
Ulysses †	98[d]	40[d]	73.0[d]	0.40	
Viroqua †	97	44	73.0	0.08	
Wallace *1	100	42	72.2	1.79	
Wamego *1	100	42	76.8	0.26	
Winona *1	100	45	68.4	2.75	
Yates Center	99	39	74.0	1.78	
Kentucky.					
Ashland	97	37	69.0	0.60	
Bardstown †	100	35	72.9	0.58	
Blandville †	96	40	73.5	0.08	
Bowling Green *a* *1	96	35	70.1	0.10	
Bowling Green *b* †	97	44	75.1	0.08	
Burnside †	.....	.....	.....	0.01	
Canton *† 1	100	42	74.2	T.	
Carlisle	100	35	71.0	0.01	
Carrollton †	99	39	71.0	0.18	
Catlettsburg †	.....	.....	.....	0.77	
Earlington	93	39	73.2	T.	
Edmonton †	93	36	70.0	T.	
Ensor	98	39	73.5	0.08	
Falmouth †	.....	.....	.....	0.43	
Frankfort †	97	37	68.2	0.33	
Georgetown	96	36	70.4	.....	
Greensburg †	105	32	73.4	T.	
Henderson †	98	42	74.7	0.08	
Hopkinsville †	98	41	75.0	T.	
Irvington	96	38	72.6	0.05	
Leitchfield †	99	34	70.9	T.	
Loretto	99	31	71.4	0.01	
Lyndon	95	35	70.6	0.10	
Marrowbone †	97	32	70.4	T.	
Middlesboro †	96	32	67.9	0.10	
Mount Herman	96	38	73.8	T.	
Mount Sterling †	96	35	69.5	0.15	
Owensboro †	97	38	72.7	0.26	
Owenton †	97	42	74.0	0.18	
Paducah *a* †	.....	.....	.....	T.	
Paducah *b* †	102	44	77.4	0.00	
Pleasure Ridge Park †	100	31	70.9	0.20	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Kentucky—Cont'd.	°	°	°	*Ins.*	*Ins.*
Princeton	100	36	74.5	T.	
Richmond †	100	38	72.6	0.53	
Russellville †	103	36	75.9	T.	
St. John †	99	37	70.6	0.03	
Sandyhook	.....	.....	.....	0.49	
Scott	100	41	71.8	1.20	
Shelby City	105	32	73.0	0.00	
Shelbyville †	102	33	72.5	0.39	
Southfork [2]	.....	.....	65.0	0.84	
Vanceburg	93	37	67.0	0.45	
Williamsburg †	97	34	67.4	T.	
Louisiana.					
Abbeville	92	50	76.9	2.95	
Alexandria †	97	41	76.4	0.97	
Amite †	96	50	77.8	1.10	
Bastrop †	100	43	77.8	1.60	
Baton Rouge †	96	44	77.0	1.91	
Calhoun	97	43	76.4	1.62	
Cheneyville †	97	41	75.6	0.85	
Clinton †	93	45	76.2	2.31	
Como	96	44	75.5	T.	
Covington	94	45	77.0	1.27	
Donaldsonville †	96	52	78.8	2.41	
Elm Hall	92	46	73.4	2.95	
Emilie †	92	52	75.4	2.66	
Farmerville	98	43	77.0	1.06	
Franklin †	94	52	76.5	4.04	
Hammond	94[e]	49	75.6[e]	1.96	
Houma	92	50	76.7	3.63	
Jeanerette	98	48	77.4	3.42	
Lafayette †	95	45	76.1	4.58	
Lake Charles †	97	49	77.4	2.28	
Lawrence	92	58	77.2	3.04	
Liberty Hill	102	43	78.6	0.82	
Mansfield †	101	37	75.6	1.50	
Melville	92	50	77.2	1.70	
Minden	100	41	78.7	0.10	
Monroe †	100	46	79.2	0.10	
Oakridge †	100	42	77.5	T.	
Oberlin	92	43	73.3	1.40	
Oxford †	99	37	75.3	1.40	
Paincourtville †	.....	.....	.....	3.29	
Plain Dealing †	98	44	77.5	3.35	
Rayne	96	45	77.0	2.86	
Robeline	98	36	74.4	0.43	
Ruston	98	51	80.0	1.60	
Schriever	95	47	76.4	5.05	
Shellbeach	92	55	78.4	4.03	
Southern University †	91	53	75.6	2.40	
Sugar Ex. Station †	92	55	78.0	3.56	
Sugartown †	97	47	77.9	1.16	
Venice †	89	61	77.6	3.68	
Wallace	91	53	76.5	3.57	
Whitehall	97	46	77.7	2.98	
White Sulphur Springs	98	44	78.6	0.53	
Maine.					
Bar Harbor	91	35	58.8	2.33	
Belfast *6	85	38	57.3	2.09	
Cornish *1	90	34	57.5	3.15	
Fairfield	89	31	58.0	2.54	
Flagstaff	90[e]	27[e]	53.2[e]	3.72	
Fort Fairfield	88	28	52.2	2.80	T.
Kineo †	83	35	57.4	2.62	
Lewiston	93	35	60.4	3.43	
Mayfield	90	30	55.0	3.01	T.
North Bridgton	92	34	58.2	2.76	
Orono	90	28	55.2	2.65	
Maryland.					
Annapolis	91	42	69.9	2.17	
Bachmans Valley	94	35	64.4	2.08	
Boettcherville [2]	.....	.....	59.5	1.50	
Charlotte Hall †	92	43	69.4	0.95	
Cherryfields † [2]	.....	.....	69.4	0.58	
Chestertown †	90	43	65.9	1.28	
Collegepark	97	36	67.1	1.78	
Cumberland *b*	95	43	68.4	1.50	
Darlington †	91	42	67.5	1.94	
Deerpark	87	22	57.6	1.67[b]	
Easton †	93	39	67.8	0.73	
Fallston *1	91	40	64.8	1.40	
Flintstone	98	28	63.6	2.24	
Frederick	95	38	66.9	1.63	
Grantsville	92	29	61.3	2.27	
Greatfalls *5	93	40	68.2	0.91	
Greenspring Furnace	98	34	66.5	2.08	
Hagerstown †	95	38	67.9	2.48	
Jewell †	.....	41	.....	1.37	
Johns Hopkins Hospital	97	42	68.2	2.22	
Laurel	95	35	67.0	1.55	
McDonogh *	91	42	67.2	.....	
Mardela Springs †	95	42	69.7	1.17	
Mount St. Marys Coll. †	95	40	68.0	2.65	
New Market	93	39	67.0	1.61	
Port Deposit	93	43	67.4	1.45	
Princess Anne	91	38	66.9	1.25	
Sharpsburg	94	35	65.6	1.54	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Maryland—Cont'd.	°	°	°	*Ins.*	*Ins.*
Smithsburg	90	38	65.5	2.41	
Solomons †	94	47	72.5	0.50	
Sunnyside	89	24[d]	60.4[b]	3.37	
Taneytown †	100	.....	.....	2.59	
Van Bibber	92	41	66.1	1.22	
Western Port	97	32	64.4	1.84	
Woodstock	90	39	65.5	1.88	
Massachusetts.					
Amherst	88	31	59.8	1.99	
Bluehill (summit)	89	33	60.5	2.18	
Cambridge *a*	94	35	62.6	3.00	
Chestnut Hill	93	35	62.6	3.22	
Concord †	92	33	59.8	2.99	
Fallriver	90	40	62.4	2.38	
Fitchburg	92	35	60.4	1.94	
Framingham	92	35	62.4	2.51	
Groton	90	33	59.6	2.85	
Hyannis *† 1	91	40	62.6	1.05	
Lawrence	94	38	62.3	2.48	
Lowell *a*	92	36	61.7	3.04	
Middleboro	91	30	60.0	1.45	
Monson	89	35	60.2	1.31	
New Bedford *a*	90	40	63.0	0.88	
Springfield Armory	89	30	58.2	1.52	
Taunton *b*	89	35	59.4	3.32	
Wakefield	93	35	61.6	2.57	
Westboro †	93	33	62.6	2.22	
Worcester *b*	88	36	61.0	1.85	
Michigan.					
Adrian	96	28	65.6	0.90	
Allegan	94	24	62.8	0.50	
Alma	96	29	64.0	1.83	T.
Ann Arbor	96	35	65.8	1.35	
Arbela	93	30	64.0	1.74	
Badaxe †	93	34	63.2	2.19	
Baldwin	96	23	61.2	1.67	
Ball Mountain	92	33	64.6	0.76	
Baraga	95	27	61.6	1.75	
Battlecreek	96	32	67.0	0.86	
Bay City *b*	95	34	64.4	0.69	
Benton Harbor	95	33	65.2	0.87	
Berlin	95	29	63.2	1.11	
Berrien Springs	99	32	67.9	0.51	
Big Rapids	92	28	62.6	1.72	
Birmingham	92	29	62.6	0.55	
Boon	92	27	60.7	3.49	
Calumet	90	37	61.2	1.52	T.
Carsonville	95	26	63.6	0.57	
Charlevoix	95	41	63.6	2.77	
Cheboygan	94	32	61.5	2.61	
Clinton	99	29	66.2	0.91	
Coldwater	96	28	65.3	0.31	
East Tawas	84	31	61.4	0.60	
Eloise	96	32	64.4	1.61	
Escanaba †	84	34	62.4	2.00	T.
Ewen	92	28	63.9	3.62	
Fairview	93	35	63.9	0.41	
Fitchburg	96	25	62.8	1.00	
Flint	96	25	62.7	0.84	
Frankfort *10	85	45	63.3	.....	
Gladwin	94	25	60.3	0.60	
Grand Rapids *b*	95	35	65.4	1.11	
Grape	96	32	66.1	1.34	
Grayling	94	24	60.7	1.80	
Grindstone City *10	88	34	61.4	.....	
Hanover	95	28	65.5	1.51	
Harrison	92[d]	29[d]	62.0[d]	1.77	
Harrisville	97	30	62.4	1.05	
Hart	96	33	65.6	1.52	
Hastings	95	29	64.8	1.17	
Hayes	90[f]	31[f]	64.2[f]	1.13	
Highland Station	.....	.....	.....	0.10	
Hillsdale	95	27	65.1	0.46	
Holland *10	87	42	67.8	.....	
Howell	96	28	65.8	0.10	
Humboldt	89	22	57.4	2.24	
Ionia	98	25	64.2	1.00	
Iron River	89	20	59.2	1.12	
Ivan	95	31	62.7	2.47	T.
Jackson	96	34	66.5	0.98	
Jeddo	95	31	64.0	0.69	
Kalamazoo	96	34	68.2	0.91	
Lake City	91	30	61.9	1.46	
Lansing	93	32	64.0	0.92	
Lapeer	96	26	63.0	0.67	
Lathrop	92	27	59.3	2.14	
Ludington	90	32	63.6	1.20	
Luzerne	93	27	59.6	1.62	
Mackinaw City	93	35	58.6	2.30	
Madison	95	30	65.8	0.44	
Mancelona	94	28	61.9	2.91	
Manistee	93	33	62.2	2.23	
Manistique	76	35	58.4	0.95	
Mayville	95	33	65.3	0.92	
Middle Island *10	86	42	61.2	.....	
Midland	97[b]	30[e]	62.9[b]	1.06	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Michigan—Cont'd.	°	°	°	*Ins.*	*Ins.*
Mottville	100	25	67.2	0.23	
Mount Clemens	97	29	65.2	0.51	
Mount Pleasant *b*	95	31	64.0	0.93	
Muskallonge Lake *10	90	36	59.9		
Muskegon	89	38	64.4	0.90	
Newberry	90	25	59.0	0.76	
North Manitou Island *10	88	40	63.6		
North Marshall	94	28	64.8	1.29	
Northport	96	42	64.3	2.85	
Old Mission	91	34	61.6	2.68	
Olivet	90	34	64.6	0.77	
Omer	95	25	60.4	0.85	
Ottawa Point *10	83	39	62.2		
Ovid	96	29	65.1	1.15	
Owosso	97[c]	38	66.2	0.53	
Parkville				0.73	
Pentwater *10	86	46	66.9		
Petoskey	93	35	63.8	2.25	
Plymouth	96	37	66.2	0.89	
Point Au Barques *10	99	32	66.2		
Point Betsey *10	80	44	63.5		
Pontiac	94	33	65.1	0.53	
Port Austin	93	29	62.4	1.30	
Powers	92	30	61.2	3.52	
Reed City	93			2.30	
Rockland *	91	33	62.6	1.70	T.
Rogers City	93[d]	33[d]	60.6[d]	2.45	
Romeo	96	35	65.7	1.22	
Saginaw	93	31	64.8	1.05	
St. Ignace	88	34	59.6	1.92	
St. Johns	97[d]	33[d]	65.7[d]	0.92	
Sandbeach *a*	94	29	62.2	0.83	
Ship Canal *10	92	32	62.2		
Sidnaw	88	23	58.5		T.
Somerset	94	29	65.0	0.52	
South Haven	93	35	65.8	1.05	
Stanton	92	30	63.2	1.43	
Sturgeon Point *10	91	38	62.3		
Thomaston				2.84	
Thornville	93	33	65.6	0.62	
Traverse City	95	38	63.3	2.00	
Two Heart River *10	94	34	61.0		
Valley Center	94	23	61.4	0.56	
Vandalia	99	31	68.6	0.60	
Vermillion Point *10	90	30	55.0		
Wasepi	95	28	65.8	0.75	
West Harrisville	91	30	61.0	1.07	
Wetmore	92	28	60.0	1.83	
White Cloud	95	30	63.4	1.65	T.
Ypsilanti	91	31	63.4	1.75	
Minnesota.					
Adat	93	31	65.2	1.10	
Albert Lea	92	29	67.2	2.41	
Alexandria †	91	34	65.3	3.73	
Beardsley	97	27	67.6	1.93	
Bermidji				0.70	
Bird Island	90	36	66.4	3.03	
Blooming Prairie †	91	32	66.8	0.60	
Bonniwell	89	36	65.1	6.50	
Caledonia †	95	31	63.8	1.96	
Camden	94	32	68.2	1.81	
Campbell	93	30	66.1	0.75	
Collegeville	88	38	66.4	3.45	
Crookston †	95	30	63.6	1.02	
Detroit City	90			1.00	
Faribault	90	32	68.2	1.09	
Farmington †	91	27	64.4	1.20	
Fergus Falls †	90	32	65.6	0.58	
Glencoe	91	31	67.0	3.87	
Grand Meadow †	95	31	67.0	0.77	
Granite Falls	92	31	66.3	1.86	
Kocchicking	90	26	60.6	0.20	
Lake City	92	30	68.0	2.14	
Lakeside †	94	35	65.8	2.42	
Lake Winnibigoshish	87	33	62.1	0.61	
Lambert †	90	32	60.8	0.79	
Lawrence				0.29	
Leech Lake	90	29	63.0	1.12	
Lesueur *1	94	30	64.6		
Long Prairie	91	29	63.9	0.28	
Lutsen	83	31	57.1	2.58	
Luverne †	92	32	67.8	1.63	
Lynd	94	34	67.6	2.79	
Maplepiain	91			2.69	
Maplewood *1	86	41	66.7		
Mazeppa[1]	98[b]	32	68.2	1.10	
Milaca				3.51	
Milan †	99	25	68.9	0.85	
Minneapolis *a*	91	33	66.3	1.97	
Minneapolis *b*[1]	92[b]	31	64.5	1.40	
Minnesota City †	93	30	67.6	0.68	
Montevideo †	94	33	67.8	1.65	
Morris	92	35	66.0	3.60	
Mount Iron	84	25	59.6	2.12	
New London	90	33	65.4	2.08	
New Richland *14	92	38	66.6		

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Minnesota—Cont'd.	°	°	°	*Ins.*	*Ins.*
New Ulm †	93	32	68.0	0.33	
Park Rapids †	90	25	61.8	0.43	
Pine River	88	30	62.0	1.71	
Pokegama Falls	89	25	61.6	1.29	
Redwing				5.09	
Reeds				2.98	
Rolling Green	91	33	68.2	1.00	
St. Charles †	91	27	66.7	1.01	
St. Cloud	85	33	64.3	4.18	
St. Olaf	89	33	64.6	0.94	
St. Peter	87	33	67.6	2.30	
Sandy Lake Dam	89	32	62.4	2.04	
Shakopee [6]	89[a]	34	67.8	1.36	
Spring Park				2.07	
Tower †	88	18	57.2	1.60	
Two Harbors †	87	32	60.8	3.72	
Wabasha *1	94	36	65.7	1.21	
Willmar †	89	35	65.2	3.39	
Winnebago City	94	33	68.8	2.51	
Worthington	91	37	68.4	2.00	
Zumbrota [1]	90[a]	32	68.9		
Mississippi.					
Aberdeen †	99	39	75.7	0.00	
Agricultural College	97	47	78.9	T.	
Austin †	96	38	74.2	0.00	
Batesville †	97	38	73.6	0.00	
Bay St. Louis	89	51	77.4	2.38	
Biloxi †	98	52	77.6	4.09	
Booneville †	99	44	76.7	0.00	
Briers †	91	51	75.0	1.00	
Brookhaven †	99	47	78.2	0.25	
Canton †	97	49	77.6	0.89	
Columbus *a* †				0.08	
Columbus *b* †	100	44	77.8	0.05	
Corinth	99	39	76.8	0.00	
Crystal Springs †.	97	49	77.6	0.34	
Enterprise	96	45	75.2	T.	
French Camps	100	36	75.5	0.65	
Fulton †	98	40	76.0	0.00	
Greenville *a*	91	53	75.9	0.02	
Greenville *b* †	97	47	77.6	T.	
Greenwood	93	51	76.4	0.10	
Hattiesburg †	92	56	78.6	0.15	
Hazlehurst †.	98	48	77.8	1.69	
Hernando	97	46	77.1	0.30	
Holly Springs †	96	44	77.8	0.00	
Jackson †	96	44	75.8	0.38	
Lake †	96	42	75.4	0.00	
Leakesville †	99	48	78.0	2.41	
Logtown †	96	49	77.2	2.78	
Louisville †	100	44	77.9	0.13	
Macon †	98	42	77.0	0.41	
Magnolia †	95	45	76.0	2.55	
Mayersville [4]	93	44	75.2	T.	
Meridian †	98	45	77.4	0.54	
Mosspoint	95	55	78.0	2.60	
Natchez †	95	47	77.5	0.85	
Okolona †	100	44	77.7	0.00	
Palo Alto	99	47	79.4	T.	
Pontotoc	99	41	78.5	T.	
Port Gibson †	97	42	75.9	0.36	
Rosedale	96	38	74.4	T.	
Tupelo †				0.00	
University	100	54	72.9	0.00	
Water Valley *† [1]	98	41	75.9	0.00	
Waynesboro *b* †	95	45	78.0	0.60	
Windham †	99	43	75.4	1.92	
Woodville †	93	50	72.0	1.89	
Yazoo City †	99	42	77.2	T.	
Missouri.					
Appleton City	100	37	75.2	1.13	
Arthur *3		40	71.1	0.74	
Avalon	99	38[d]	75.2[d]	1.34	
Birchtree	97	35	72.0	0.94	
Boonville †				0.03	
Brunswick	95	41	73.2	0.71	
Carrollton †	96	42	75.2	0.96	
Conception	95	41	74.4	0.87	
Cowgill *5	100	44	77.0	2.25	
Darksville †	98	40	75.2	0.80	
Downing				1.20	
East Lynne *3		40	69.4	1.33	
Edgehill *5	94	38	70.4	0.11	
Eightmile *1	100	40	74.0	1.45	
Eldon *1	99[a]	35	73.5	0.61	
Elmira	105	35	74.5	2.70	
Emma *3	102	44	72.8	1.52	
Fairport				0.80	
Farmersville				2.08	
Fayette	101	39	76.6	1.49	
Fulton				0.28	
Gallatin *1	103	40	76.8	1.55	
Glasgow	102	38	76.0	0.78	
Gordonville				0.89	
Gorin				1.15	
Halfway	100	38	74.5	0.11	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Missouri—Cont'd.	°	°	°	*Ins.*	*Ins.*
Harrisonville †	103	41	75.4	0.93	
Hastain	101	36	74.4	0.90	
Hermann †				0.38	
Houston	99	32	73.3	0.32	
Houstonia				1.21	
Humansville	105	35	77.2	0.25	
Irena				1.06	
Ironton †	102	29	72.2	0.48	
Jefferson City †	98	37	75.7	0.20	
Kidder	98	36	74.2	1.53	
Lamar †	104	37	75.8	0.06	
Lamonte				1.26	
Lebanon	99	39	76.8	0.30	
Lexington †	101	36	76.8	1.13	
Liberty	99	40	74.9	1.80	
McCune †				0.75	
Malden				0.05	
Mansfield				0.65	
Marblehill	99	33	72.4	0.66	
Marshall †	102	36	74.8	1.31	
Maryville	101	38	74.0	1.08	
Mexico †	103	36	75.4	0.56	
Mineralspring	96	36	73.2	0.59	
Montreal *1	96	40	73.0	0.28	
Mount Vernon	103	36	77.9	0.04	
Neosho	96	34	73.1	T.	
Nevada *5	98	38	76.4	0.11	
New Haven *1	96	45	77.7	0.55	
New Madrid	103	36	76.2	0.00	
New Palestine *† [1]	96	58	79.0	0.43	
Oakfield	99	42	76.6	0.25	
Oakmound				1.30	
Oakridge *4		38	71.0	0.80	
Olden †	96	39	73.3	0.31	
Oregon *a*	99	44	76.2	0.69	
Oregon *b*	98	43	75.3	0.56	
Osceola †				0.40	
Oto				T.	
Palmyra *5	96	40	76.0	0.29	
Phillipsburg *† [1]	99	44	74.2	0.15	
Pickering *3	100	36	68.4	0.93	
Platte River *3	96	40	68.6	0.83	
Poplar Bluff	100[d]	36[d]	73.6[d]	0.04	
Potosi	92	27	66.2	0.43	
Princeton	101	36	75.6	0.85	
Rhineland	95	36	73.4	0.53	
Ricemond	96	45	75.4	1.98	
Rolla				0.92	
St. Charles	98	41	75.2	0.23	
St. James *3		43	70.8		
St. Joseph †				0.91	
St. Louis	98	36	72.4	0.13	
Sarcoxie *3	100	34[d]	68.1[d]	0.03	
Sedalia	100	34	74.5	0.35	
Seymour *1	98	40	71.4	1.75	
Shelbina				0.60	
Sikeston	98	37	73.2	0.13	
Stellada †	102	36	75.6	0.60	
Sublett	98	35	73.5	1.60	
Trenton	93	39	72.6	1.38	
Unionville †	101	36	74.5	1.52	
Vichy	100	36	75.3	1.37	
Virgil City				0.14	
Warrenton	100	37	75.0	0.22	
Wheatland				0.59	
Willow Springs	96	33	72.0	0.26	
Zeitonia *1	101	33	72.0	0.24	
Montana.					
Billings	98	31	63.0	0.40	
Bozeman †	87[c]	31[d]	58.9[c]	0.95	
Bozeman Exper. Stat'n.	81	34	56.0	1.12	
Butte † [b]	82	31	54.4	0.98	T.
Castle	82	17	53.0	0.72	2.1
Chinook †	87	31	58.8	0.24	
Choteau	92	25	57.9	0.98	
Fort Benton	92	26	60.6	0.61	
Fort Custer †	98	30	64.9	0.65	
Fort Keogh †	102	28	65.4	0.04	
Fort Logan †	84	32	55.1	0.48	T.
Fort Missoula	82	33	55.2	3.42	
Glendive †	102	32	65.8	0.10	
Glenwood	80	26	55.5	1.34	
Greatfalls †	90	31	60.6	1.04	T.
Hogan †	82	27	55.8	0.62	2.0
Kalispell	77	31	54.4	2.27	
Kipp †	89	22	52.4	1.39	1.5
Livingston †	88	30	61.6	0.43	
Manhattan †	86	29	53.6	1.02	
Martinsdale †	85	22	58.1	0.23	
Marysville †	79	28	55.6	1.56	T.
Poplar	92	25	64.0	0.05	
Radersburg				2.75	
St Ignatius Mission	76	31	54.2	3.60	
St. Pauls †	86	30	61.3	0.00	
Troy	87	32	55.0	2.51	
Utica †	88	25	59.0	0.15	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Montana—Cont'd.	°	°	°	*Ins.*	*Ins.*
Virginia City†	82	35	57.4	1.64	2.5
Yale†	90	32	57.0	0.17	
Nebraska.					
Agee *1	100	46	70.7	2.68	
Albion		38		1.82	
Alliance *1	92	40	64.8	0.06	
Ansley†	95	35	72.2	1.37	
Arapaho *1	100	45	70.7	4.88	
Arborville *1	101	46	72.8	1.02	
Arcadia	100	36	70.2	1.45	
Ashland *a*†	103	41	74.8	3.70	
Ashland *b* *1	100	44	75.4	3.65	
Ashton	98	40	73.5	1.94	
Auburn *†1	101	40	76.9	3.38	
Aurora *1	100	47	73.4	2.07	
Beatrice†	100	41	72.8	1.02	
Beaver City†	106	42	73.5	2.16	
Benedict				0.78	
Benkelman				1.65	
Bluehill *1	102	48	73.2	3.12	
Brokenbow				1.14	
Burchard				4.35	
Burwell				T.	
Callaway†	97	37	67.4	1.15	
Camp Clarke	102	30	67.3	0.41	
Central City				2.96	
Chester *1	104	50	73.8	1.05	
Columbus†	94	39	68.9	2.22	
Cornlea				1.62	
Creighton† *k	98	29	73.6	0.90	
Crete	99	43	73.4	1.11	
Culbertson				1.13	
Curtis *a*	101	43	72.2	1.27	
David City *†1	94	45	72.0	1.10	
Dawson	100	39	74.6	3.86	
Divide				2.10	
Dunning *1	97	48	74.4	0.46	
Eden				3.49	
Edgar *1	98	48	75.1	3.15	
Elba				1.53	
Ericson *†1	98	47	74.4	0.87	
Ewing†				0.76	
Fairbury†	101	37	72.4	1.37	
Fairmont†	101	43	73.2	2.31	
Fort Robinson	97	38	67.2	T.	
Franklin	113	43	75.8	2.46	
Fremont†	96	38	71.4	0.56	
Geneva†	101	42	72.3	2.94	
Genoa	97	42	71.9	2.71	
Gering†	97	33	67.1	0.30	
Gothenburg	100	40	70.2	1.71	
Grand Island *a* *1	102	48	78.3	1.60	
Grand Island *b*	100	45	72.6	2.15	
Greeley				1.85	
Haigler				0.51	
Hartington†	98	33	71.6	1.01	
Harvard *1	101	46	72.0	1.34	
Hastings *1	99	47	71.9	2.33	
Hayes Center				1.19	
Hay Springs	95	35	67.3	0.18	
Hebron†	101	40	73.6	1.22	
Hickman				1.68	
Holdrege *b* *1	100	48	74.8	2.30	
Imperial *a*†	98	36	71.2	0.51	
Indianola (near) *1	98[f]	46[d]	70.8[d]	1.88	
Kearney *b	96	46	75.4	2.51	
Kennedy	99	33	67.5	0.63	
Kimball†	93	29	66.9	0.44	
Kirkwood *1	101	47	72.0	1.60	
Lexington†	97	39	67.7	1.60	
Lincoln *b*†	99	42	74.8	1.69	
Lincoln *d*	100	40	74.4	1.65	
Lodgepole†	95	32	65.8	T.	
Loup *a*				2.68	
Loup *b* *1	98	38	70.9	2.97	
Lynch *†1	102	34	72.2	2.25	
Lyons				0.11	
McCook *1	100	48	74.6	1.04	
McCool				1.90	
Madison *1	94	38	69.4	1.40	
Madrid *5	101	35	70.8	0.22	
Marquette				1.83	
Minden *a*	102	40	72.4	1.04	
Minden *b*				1.02	
Monroe				2.06	
Nebraska City *c*	101	38	74.4	1.58	
Nemaha *1	102	42	70.0	3.22	
Nesbit	97	38	69.1	1.57	
Norfolk *a*†	94	39	72.0	1.43	
Norfolk *b*	94	38	71.0	1.53	
Norman	100[j]	41[j]	72.6[j]	1.72	
North Loup †	97	36	69.8	1.00	
Oakdale†	96	36	70.6	1.15	
Odell *5	96	46	73.6	4.00	
O'Neill†	97	37	69.3	3.10	
Ord	96	34	71.2	0.96	
Nebraska—Cont'd.					
Osceola				0.77	
Ough†				0.63	
Palmer *b*				2.69	
Ravenna *a*	97	39	71.5	1.63	
Ravenna *b* *1	93	44	68.4	0.20	
Redcloud *a*				1.44	
Republican *1	100	44	67.3	1.23	
Rulo *1	98	50	75.6	0.90	
St. Libory	95	42	73.2	3.07	
St. Paul	97	42	73.4	1.41	
Salem *1	98	44	71.8	1.10	
Santee Agency†	102	37	74.5	1.66	
Sargent				0.57	
Schuyler				0.60	
Seneca *1	94	38	69.8	0.89	
Seward *1	98	47	70.1	0.99	
Springview	98	40	72.3	2.01	
Stanton *1	97	43	70.6	1.13	
State Farm	103	38	74.6	1.92	
Stockham				1.40	
Strang *1	100	48	76.6	1.56	
Stratton				0.90	
Stromsburg				0.75	
Superior *5	96	46	74.2	2.08	
Sutton				2.25	
Syracuse				2.77	
Tecumseh *b*†	100	40	71.6	0.61	
Tekamah	98	32	71.8	0.57	
Thedford *1	98	34	69.1	2.50	
Turlington†	98	37	70.8	2.12	
Valentine †	99	36	70.2	0.67	
Valparaiso				1.01	
Wakefield	97	32	71.8	0.37	
Wallace *1	96	42	68.4	0.12	
Weeping Water *1	96	39	69.4	3.96	
Westpoint†	97	36	71.2	0.20	
Whitman				0.05	
Wilber *1	94	46	75.5	1.38	
Willard				0.78	
Wilsonville *1	100	46	73.8	2.70	
Wisner *5*d	96	42	74.4	0.78	
Woodlawn				2.22	
York *1	95	47	74.8	0.72	
Nevada.					
Austin	79	34	58.1	0.67	
Battle Mountain *1	85	39	58.2	0.00	
Beowawe *1	89	40	63.0	T.	
Candelaria	89	37	63.8	0.51	
Carlin *1	87	33	58.5	0.00	
Carson City	83	29	57.7	0.01	
Cranes Ranch				0.19	
Darrough Ranch				0.16	
Downeyville	97	40	69.1	0.09	
Elko *5	90	35	55.8	T.	
Elko (near)	86	23	55.8	T.	
Ely	80	22	53.4	0.04	
Fenelon *1	80	40	55.8	0.10	
Golconda *1	82	40	56.4	0.10	
Halleck *1	90	40	56.4	T.	
Hamilton	90	25	57.2	0.00	
Hawthorne *a* *5	89	41	66.7	0.02	
Hawthorne *b*	88	40	64.3	0.02	
Hot Springs *1	90	46	68.3	0.02	
Humboldt *1	85	40	61.8	0.11	
Keysers Springs				0.05	
Lewers Ranch	83	29	58.0	0.08	
Los Vegas	90[d]	48	69.4	0.02	
Lovelock *1	90	50	67.6	0.00	
McGill	80	22	56.4	0.02	
Martins	88	29	57.5	0.26	
Midas	81	40	60.6	1.00	
Mill City *1	85	35	58.0	0.00	
Monitor Mill	83	26	55.5	0.27	
Osceola	84	41	63.4	0.41	
Palisade *5	87	45	67.7	0.00	
Palmetto	82	27	57.4	1.27	
Reno *5	87	37	63.4		
Reno State University	82	30	56.9	0.02	
Ruby Valley				0.61	
St. Clair	84	34	60.6	0.05	
St. Thomas	105	40	73.4	T.	
Silver Peak	90	42	67.2	T.	
Tecoma *1	90	44	63.8	T.	
Toano *1	86	43	60.7	0.22	
Tuscarora	81	21	53.9	0.10	
Tybo	84	40	62.0	0.45	
Verdi *1	86	36	56.0	T.	
Wadsworth *1	90	40	62.5	0.25	
Wells	85	26	57.1		
New Hampshire.					
Concord	90	28	57.4	1.22	
Durham	95	33	59.7	2.71	
Grafton†	92	25	56.7	1.13	
Hanover	88	33	57.0	1.57	
Keene	92	29	57.8	1.77	
Lancaster	90	26	55.1	1.31	
New Hampshire—Cont'd					
Nashua	94	32	60.1	2.07	
Newton	92	30	58.6	3.16	
North Conway	95	30	57.8	1.45	
Peterboro	90	28	57.3	1.66	
Plymouth	92	27	57.2	0.92	
Sanbornton†	89	32	56.8	1.32	
Stratford	96	27	58.6	2.36	
Warner				1.40	
West Milan	90	26	55.0	2.40	T.
New Jersey.					
Asbury Park	96	40	67.6	1.77	
Barnegat	99	45	69.3	1.48	
Bayonne	98	41	67.9	1.26	
Belvidere	97	37	64.6	3.52	
Beverly†	97	40	67.1	1.42	
Billingsport *1	90	47	66.7	1.05	
Blairstown	96	39	64.8	3.97	
Boonton	95	38	65.8	2.48	
Bridgeton	94	43	69.0	0.49	
Camden	92	45	65.9	0.86	
Cape May	91	45	68.3	0.39	
Cape May C. H.†	91	41	67.2	0.55	
Charlotteburg	91	33	61.6	2.90	
Chester	87	39	61.6	2.48	
Clayton	95	42	67.3	0.46	
College Farm†	96	40	66.2	2.10	
Deckertown	90	37	62.6	2.72	
Dover	98	38	61.4	2.19	
Egg Harbor City	95	37	66.2	1.09	
Elizabeth†	97	39	61.7	1.50	
Englewood	92	33	66.0	1.51	
Franklin Furnace	88	33	61.6	3.09	
Freehold	88	39	64.2	1.64	
Friesburg				0.61	
Gillette	97	39	62.3	2.40	
Hammonton				0.94	
Hanover	90	38	63.1	2.10	
Hightstown	93	41	65.1	0.77	
Imlaystown	98	40	66.8	1.44	
Junction				1.58	
Lambertville	95	38	65.3	0.97	
Moorestown	95	40	66.6	1.42	
Newark *b*†	95	42	65.9	2.20	
New Brunswick *a*	97	39	67.4	2.09	
New Brunswick *b*	92	40	64.2	2.10	
Newton	91	39	61.4		
Ocean City	96	42	68.5	0.75	
Oceanic	92	44	65.5	0.89	
Paterson	91	41	65.2	2.82	
Perth Amboy	96	40	65.9	2.15	
Plainfield	91	36	64.1	2.81	
Port Norris	93	37	67.4	0.21	
Rancocas				1.43	
Readington *6	96	46	69.4		
Rivervale	94	30	62.0	2.38	
Roseland	96	34	64.4	2.88	
Sergeantsville	95	39	64.8	1.46	
Somerville	99	33	66.6	2.03	
South Orange	90	40	63.8	1.51	
Staffordville				1.15	
Toms River	95	35	65.6	3.12	
Trenton	94	46	69.4	1.06	
Vineland	97	40	67.2	0.46	
Woodbine	95	35	65.5	0.90	
New Mexico.					
Albert	91	46	70.6	0.42	
Albuquerque†	88	51	68.2	1.22	
Angus V. V. Ranch	77	37	58.6	2.72	
Aztec†	90	44	63.6	2.79	
Bernalillo†	92	50	68.7	4.02	
Buckmans	80	26	52.1	3.09	
Clayton	90	42	68.6	0.35	
Deming *8	92	58	70.8	1.87	
East Lasvegas†	80	40	62.2	0.79	
Eddy	94	40	70.6	0.76	
Engle†	92	49	68.0	3.23	
Espanola †	90	45	66.5	2.20	
Fort Bayard	87	47	65.0	4.11	
Fort Union	79	41	63.2	1.16	
Fort Wingate	89	42	63.4	3.11	
Galisteo†	85	45	65.6	1.07	
Gallinas Spring†	89	43	67.1	1.01	
Gila	94	52	72.2	5.26	
Las Cruces†	90	46	69.2	2.14	
Los Lunas	92	41	65.0	0.55	
Lower Penasco	83	45	64.3	1.80	
Monero †	88	32	57.9	3.66	
Olio	95	43	64.8	2.15	
Puerto de Luna†	89	44	69.4	0.63	
Rincon†	92	49	70.6	4.23	
Roswell †	91	42	68.4	1.25	
San Marcial†	90	54[e]	72.4	2.92	
Socorro	90	48	68.6	2.47	
White Oaks†	82	42	63.6	2.85	
New York.					
Adams				0.78	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean	Rain and melted snow.	Total depth of snow.
New York—Cont'd.	°	°	°	*Ins.*	*Ins.*
Addison	91	32	60.0	2.90	
Akron				0.62	
Alfred	90	32	59.7	2.88	
Angelica †	90	28	59.3	1.74	
Appleton	91	35	61.6	0.28	
Arcade	86	29	59.2	1.13	
Atlanta				2.34	
Auburn	95	32	62.0	3.29	
Avon	93	30	60.2	1.42	
Baldwinsville	91	36	61.6	1.20	
Bedford	89	31	61.3	2.75	
Big Sandy *[10]	84	36	58.4		
Binghamton †	91	30	60.1	3.57	
Bolivar	89	26	57.4	2.06	
Bouckville	86	33	58.4	3.01	
Boyds Corners				1.74	
Brentwood	93	35	61.6	2.30	
Brooklyn	90	44	66.6	1.90	
Canajoharie	87	37	61.7	1.98	
Canton	89	25	57.2	1.24	
Carmel	92	32	61.8	1.74	
Catskill	90	37	62.2	3.99	
Cedar Hill				2.15	
Charlotte *[10]	86	39	58.7		
Chenango Forks				2.45	
Cherry Creek				1.11	
Cooperstown †	86	31	57.5	3.40	
Cortland	92	32	59.2	3.13	
Dryden	91	29	58.6	4.45	
Eagle Mills				1.25	
Easton				1.82	
Elmira	94	34	62.7	3.70	
Fayetteville				1.46	
Fleming	92	37	63.3	3.46	
Fort Niagara †	95	38	65.2	1.00	
Franklinville	91	23	59.0	0.90	
Fulton				1.86	
Garrattsville	86	32	56.8	3.14	
Glens Falls	91	30	58.2	1.19	
Gloversville	88	30	58.2	1.78	
Greenwich	88	30	59.0	1.55	
Haskinsville				2.73	
Honeymead Brook	87	35	59.2	1.62	
Humphrey †	90	31	60.6	1.25	
Ithaca	93	36	61.7	4.72	
Jamestown	88	32	60.9	0.75	
Kings Station				1.65	
Lake George	88	36	59.0	1.23	
Lake Placid	85	33	57.5	2.35	
Little Falls	84	30	58.7	1.90	
Lockport	88	35	61.3	0.90	
Lowville	88	29	57.5	1.72	
Lyndonville				0.29	
Lyons	94	38	61.2	1.18	
Madison Barracks †	86	33	57.8	0.79	
Middletown	90	36	61.6	2.86	
Mohonk Lake	86	39	62.0	1.89	
Mount Morris				1.00	
Newark Valley				4.71	
New Lisbon	88	26	56.0	3.19	
Niagara Falls				0.89	
North Hammond †	90	34	60.4	1.70	
North Lake	84	30	55.1	2.56	
Number Four †	84	28	54.5	3.37	T.
Ogdensburg	87	33	60.5	0.56	
Oneonta	90	29	59.4	3.84	
Oxford	90	27	58.4	3.13	
Palermo	91	32	59.3	0.69	
Penn Yan	95	56	63.3	1.90	
Perry City	93	31	58.6	2.58	
Phœnix				1.49	
Pine City				3.48	
Pittsford	94	32	61.4	0.98	
Plattsburg Barracks †	95	38	57.9	1.90	
Port Jervis	87	34	62.2	2.22	
Poughkeepsie	93	31	61.4	1.83	
Primrose	93	37	63.3	1.84	
Ridgeway	91	35	63.2	0.47	
Rome	82	30	57.4	2.30	
Romulus	97	37	63.2	3.95	
Rose				1.12	
St. Johnsville	85	33	58.8	1.80	
Saranac Lake	89	28	55.6	2.75	T.
Schenevus				3.01	
Scottsville				1.37	
Setauket †	88	46	64.5	1.30	
Sherwood				3.07	
Skaneateles				2.73	
South Canisteo [1]	91	28*	56.2	3.47	
Southeast Reservoir				1.79	
South Kortright †	86	25	56.0	4.67	
Straits Corners	92	33	61.4	4.01	
Ticonderoga	93	33	59.4	1.32	
Tyrone				0.30	
Warwick				2.34	
Watkins	96	36	62.9	2.75	
New York—Cont'd.	°	°	°	*Ins.*	*Ins.*
Waverly †	95	31	61.9	3.42	
Wedgwood	97	34	63.8	2.66	
Westfield	87	37	62.8	0.58	
Westpoint †	95	30	60.6	2.90	
Willetspoint	96	42	66.1	1.67	
North Carolina.					
Abshers	98	33	68.8	1.18	
Asheville †	95	35	67.1	0.54	
Beaufort †	92	56	74.4	2.51	
Biltmore †	94	30	66.8	0.48	
Bryson City †				0.50	
Chapelhill †	101 [h]	43 [i]	71.6 [h]	1.15	
Edenton	94	46	71.6	1.16	
Experimental Farm	97	46	73.2	0.66	
Fairbluff †				3.80	
Fayetteville †	98	45	72.0	1.42	
Flatrock	89	33	63.4	1.81	
Goldsboro †	95	47	73.0	0.85	
Greensboro †	101	46	72.4	2.06	
Greenville	91	48	71.2	1.10	
Henderson †	100	48	72.8	1.21	
Highlands	83	35	61.9	1.06	
Horse Cove	93	41	68.0	1.24	
Jacksonville		49		2.06	
Lenoir *† [1]	92	44	68.0	2.14	
Linville †	82	38	58.0	1.83	
Littleton †	96	41	70.5	0.25	
Louisburg †	96	42	71.8	0.65	
Lumberton †	97	50	73.2	1.65	
Lynn †	92	42	70.3	2.42	
Mana				0.65	
Marion	98	40	69.1	0.59	
Moncure †	97	44	72.2	2.39	
Monroe †	93	43	71.0	2.02	
Morganton	100	40	70.6	1.60	
Mountairy †	95	36	67.2	1.23	
Mount Pleasant	98	45	72.0	2.12	
Murphy †				0.60	
Newbern †	92	58	75.0	0.74	
Oakridge †	94	39	70.2	1.05	
Pantego				0.95	
Pittsboro †	93	43	69.2	3.25	
Rockingham †	100	48	74.6	0.70	
Roxboro †	96	35	70.4	1.10	
Salem †	98	39	71.1	0.60	
Salisbury †	98	45	72.7	1.75	
Saxon †	100	32	70.4	0.95	
Selma	97	46	72.6	0.25	
Settle	100	48	72.4	1.00	
Sloan †	97	49	73.0	2.04	
Soapstone Mount †	95	39	69.2	1.31	
Southern Pines *a* †	100	44	74.2	0.83	
Southern Pines *b*	100	44*	73.4	0.79	
Southport †	92	50	73.3	6.14	
Tarboro	101	39	72.7	1.08	
Waynesville †	90	30	62.2	0.19	
Weldon †	96	40	71.1	4.30	
Willeyton	94	39	70.8	1.04	
North Dakota.					
Amenia	95	23	63.6	0.11	
Aneta	97	29	65.0	0.00	
Ashley †	97	26	65.9	0.06	
Bottineau	98	26	61.8	0.21	
Buxton	93	30	63.2	0.54	
Churchs Ferry	100	30	64.0	0.38	
Coalharbor †	100	32	65.6	0.34	
Devils Lake †	96	30	64.6	T.	
Dickinson	98	27	64.6	0.36	
Dunseith [4]	104	32	64.5	0.70	
Ellendale	98	27	66.3	T.	
Falconer	105	28	65.7	0.03	
Fargo † [6]	93*	29	65.3	0.57	
Forman †	99	28	66.8	0.25	
Fort Berthold	99	30	64.8	0.45	
Fort Yates †	107	30	66.0	0.90	
Gallatin †	98	18	66.4	T.	
Glenullin	101	32	65.0	0.54	
Goetz	101	29	65.0	0.08	
Grafton †	96	25	62.4	0.00	
Grand Rapids †	98	26	64.8	0.14	
Hamilton	95	24	61.0	0.67	
Jamestown †	94	30	63.0	0.00	
Langdon †	93	23	66.5	0.10	
Larimore † [4]	96	27	60.7	T.	
Lisbon	97	30	65.3	0.51	
McKinney	98	25	61.2	T.	
Medora † [5]	107	34	66.8	0.24	
Milton †	93	23	60.6	T.	
Minnewaukon	97	30	63.0	0.42	
Minot †	103	31	64.3	0.23	
Minto †	97	23	62.6	0.09	
Napoleon †	107	28	66.2	0.10	
Oakdale †	93 [f]	40 [f]	65.8 [f]	0.30	
Portal	95	25	61.0	0.59	
Power †	96	27	65.4	0.22	
St. John †	94	31	62.6	0.42	
North Dakota—Cont'd	°	°	°	*Ins.*	*Ins.*
Sheyenne	96	26	64.6	T.	
Steele †	102	29	66.0	0.40	
Towner †	102	30	62.8	0.11	
University				0.10	
Valley City †	92	27	60.7	0.15	
Wahpeton †	96	28	66.8	0.28	
White Earth	100	25	64.7	0.25	
Whites Ranch	109	26	65.8	0.92	
Wildrice † [2]			61.2	0.52	
Willow City	100	27	61.8	0.34	
Woodbridge †	96	27	61.3	0.07	
Ohio.					
Akron	95	36	65.8	1.07	
Ashland	90	33	62.5	0.18	
Ashtabula	88	39	64.2	0.54	
Atwater				2.04	
Bangorville	94	36	67.4	0.65	
Bellefontaine	96	41	72.0	0.57	
Bement				1.30	
Benton Ridge	101	28	68.1	0.85	
Bethany	99	40	72.5	0.39	
Bigprairie	94	29	63.6	1.10	
Binola				0.79	
Bissells	94	34	65.3	1.30	
Bloomingburg	95	35	68.0	0.49	
Bowling Green	99	26	65.7	0.28	
Bucyrus	96	30	65.4	1.25	
Cambridge	96	27	63.4	0.47	
Camp Dennison	101	34	69.3	0.35	
Canal Dover	96	28	63.2	0.69	
Canton †	93	33	64.7	1.07	
Carrollton	98	27	69.8	0.66	
Cedarville				0.24	
Celina	101	29	68.2	0.92	
Cherryfork	100	29	72.1	0.74	
Chillicothe †	96	37	67.2	0.99	
Circleville	98	35	68.5	0.72	
Clarksville	97	33	68.7	0.32	
Cleveland *a*	88	38	64.0	1.14	
Cleveland *b*	91	38	66.0	0.92	
Clifton	104	28	68.6	0.23	
Coalton	98	31	66.8	1.08	
Colebrook	92	32	65.8	1.27	
Dayton *a*	101	31	69.0	0.15	
Dayton *b* †				0.14	
Defiance	98	26	66.0	0.27	
Delaware	96	31	65.8	0.85	
Demos	94	37	67.5	0.28	
Dupont	96	30	64.2	1.40	
Elyria	97	35	66.5	1.31	
Fairport Harbor *[10]	89	46	66.2		
Fayetteville	97	36	68.8	0.72	
Findlay	102	29	68.8	0.79	
Frankfort	95	30	65.2	0.35	
Garrettsville †	95	29	62.6	1.22	
Granville	97	29	64.3	0.69	
Gratiot	94	30	65.0	0.75	
Greenfield	94	37	67.6	T.	
Greenhill	97	25	63.8	0.87	
Greenville	90	35	65.0	0.79	
Hackney				0.50	
Hanging Rock	99	35	69.5	0.62	
Hedges	100	37	69.1	0.28	
Hillhouse	93	31	63.4	0.88	
Hillsboro †	101	31	68.8	0.42	
Hiram	91	36	65.4	0.76	
Hudson	98	32	65.4	1.33	
Jacksonboro	105	39	72.6	0.65	
Kenton †	97	34	68.4	0.60	
Killbuck	95	28	63.2	1.03	
Lancaster	97	33	66.2	1.35	
Leipsic	96	26	63.7	0.76	
Levering				0.66	
Logan	105	36	69.0	1.36	
Lordstown	96	31	63.5	0.93	
McArthur	99	27	66.2	0.86	
McConnelsville †	100	34	67.4	0.77	
Mansfield †				0.50	
Marietta *b*	93	38	67.2	0.29	
Marion	99	31	68.0	0.94	
Medina	99	30	66.0	1.14	
Milfordton	100	28	65.6	1.07	
Milligan	101	28	65.2	0.61	
Millport	98	26	63.0	0.76	
Montpelier	96	28	65.4	0.87	
Napoleon	98	28	65.2	0.46	
New Alexandria	98	34	66.4	1.42	T.
New Berlin	97	32	65.1	1.56	
New Bremen				0.53	
New Comerstown	96	29	64.0	0.67	
New Holland	100	33	67.8	0.13	
New Paris	102			0.99	
New Waterford	93	29	63.2	1.59	
Norwalk	100	32	66.7	0.66	
Oberlin	98	31	66.0	0.73	
Ohio State University	97	31	65.8	0.60	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Ohio—Cont'd.	°	°	°	*Ins.*	*Ins.*
Orangeville	89	27	61.3	1.17	
Ottawa	96	32	67.4	0.63	
Pataskala†	99	28	67.0	0.42	
Philo	99	31	68.4	1.66	
Plattsburg	97	35	68.8	1.20	
Pomeroy	98	35	69.4	0.45	
Portsmouth *a*†				1.78	
Portsmouth *b*	97	36	69.5	1.78	
Richwood	95	32	69.2	0.52	
Ridgeville Corners	100	28	67.4	0.48	
Ripley	97	39	69.6	0.69	
Rittman	92	27	66.4	0.52	
Rockyridge	100	33	67.7	0.70	
Rosewood	93	30	65.7	0.43	
Shenandoah	97	30	65.8	0.20	
Sidney *b*	99	33	67.7	0.50	
Sinking Spring†	94	35	68.0	0.41	
Somerset†	98	42	70.9	0.97	
Springboro				0.72	
Spring Valley	99	32	67.2	0.72	
Strongsville				1.13	
Sylvania	95	28	63.4	1.88	
Thurman	104	30	69.7	1.08	
Tiffin†	95	35	66.8	0.48	
Upper Sandusky	96	32	67.0	0.25	
Urbana	93	37	65.6	0.60	
Vanceburg	97	35	68.2	0.35	
Van Wert	97	31	66.8	0.21	
Vermillion	92	36	66.2	1.45	
Vickery	98	32	66.8	0.60	
Walnut				0.63	
Warren	95[b]	33[b]	65.1[b]	1.55	
Warsaw	99	26	65.4	0.58	
Wauseon	99	28	67.6	0.76	
Waverly	102	33	69.2	1.54	
Waynesville	98	39	68.2	0.83	
Wellington	98	32	66.5	0.72	
Westerville	92	33	65.0	1.16	
Willoughby				1.17	
Wooster *b*†	96	28	63.8	0.29	
Youngstown	94	30	61.3	1.04	
Zanesville†				1.01	
Oklahoma.					
Alva[4]	105	40	75.2	2.40	
Anadarko†	103	42	75.7	0.35	
Arapaho†	105	49	75.0	2.30	
Beaver				0.53	
Burnett†	98	41	72.6	2.93	
Clifton†	102	38	74.1	0.60	
Edmond				0.76	
Fort Reno†	99	48	75.4	1.27	
Fort Sill	99	48	74.8	1.75	
Guthrie	96	41	71.8	0.93	
Hennessey	101			8.10	
Keokuk Falls	99	40	75.2	0.50	
Kingfisher[4]	102	49	76.2	5.58	
Mangum†	101	48	73.6	2.78	
Newkirk	100	47	76.2	2.50	
Norman†	102	45	76.5	1.32	
Pondereek[c]	99	46	76.2	1.36	
Prudence†	97	50	73.4	4.49	
Sac and Fox Agency†	101	38	74.4	1.60	
Stillwater†	98	40	74.2	0.71	
Waukomis	100	51[f]	75.4[c]	2.25	
Woodward	100	40	74.4	2.11	
Oregon.					
Albany *a*	85	42	60.0	1.98	
Arlington	90	37	63.4	0.38	
Ashland *b*	93	34	60.2	0.66	
Aurora *a*†	84	41	57.7	2.95	
Aurora (near)	84	35	57.5	2.64	
Bandon	73	38	55.8	2.83	
Bay City†	84	36	55.9	5.41	
Brownsville *a*	89	50	63.8	2.21	
Burns	83	20	54.8	2.50	
Burns (near)	85	27	57.0	1.14	
Canyon City	85	34	57.2	1.30	
Cascade Locks	84	42	60.4	4.01	
Comstock *a*	92	39	60.7	1.97	
Corvallis	87	40	63.8	1.57	
Dayville†	88	32	57.9	0.93	
Fairview	90	41	60.8	4.14	
Falls City	83			2.93	
Fife†	85	26	52.0	1.30	
Forest Grove	89	30	57.3	3.50	
Fort Klamath	81	24	50.6	0.36	
Gardiner	83	44	57.5	2.53	
Glenora	85	34	56.6	3.88	
Government Camp	85	27	50.6	3.80	
Grants Pass *a*†	96	34	61.8	0.72	
Happy Valley	84	21	52.4	0.36	
Heppner	93[c]	35[4]	59.6[c]	1.24	
Hood River (near)	86	41	59.2	1.29	
Irvington				2.62	
Jacksonville	90	36	61.2	0.72	
Joseph	79	31	52.3	2.15	
Oregon—Cont'd.	°	°	°	*Ins.*	*Ins.*
Junction City *a*	88	44	60.2	1.14	
Lafayette *a*	83	47	60.3	2.38	
Lakeview†	80	31	54.2	0.86	
Langlois	87	44	60.4	3.37	
Lone Rock	89	25	52.6	1.79	
McMinnville	88	33	58.4	2.31	
Merlin *a*	98	38	58.6	0.52	
Monmouth *a*	86	39	61.0	1.50	
Monroe	84	43	59.5	1.35	
Mount Angel†	88	40	60.0	2.91	
Nehalem				3.70	
Newberg				0.87	
Newbridge	87	32	57.6	0.58	
Newport	87	42	56.4	2.14	
Pendleton	94	31	60.2	1.54	
Prineville	86	28	54.4	0.89	
Riddles *a*	95	42	61.5	0.62	
Riverside	92	26	58.2[d]	0.14	
Salem *b*†	83	39	58.7	2.45	
Sheridan *a*	87	47	60.6	2.39	
Silver Lake	86	21	50.6	0.39	
Silverton *a*	88	48	59.8	3.39	
Siskiyou *a*	88	42	60.2		
Sparta	84	34	56.8	0.90	
Springfield *a*	85	40	59.3	2.55	
Stafford	85[c]	35[c]	58.3[c]	1.86	
The Dalles†	89	39	62.3	0.54	
Toledo	86	31	54.6	4.03	
Umatilla				0.52	
Vale	85	29	58.4	0.42	
Vernonia	93	34	58.1	2.37	
West Fork *a*	92	38	58.1	1.88	
Weston	90	31	59.2	1.70	
Williams	90	31	58.8	1.02	
Pennsylvania.					
Altoona	93	37	65.2	2.89	
Aqueduct	98	37	66.2	2.66	
Beaver Dam				1.90	
Bethlehem				2.10	
Blooming Grove	90	31	61.4	3.56	
Brookville†				2.85	
Browers Lock				1.84	
Cameron				2.55	
Canonsburg	96	36	68.8	0.25	
Carlisle				2.97	
Cassandra	88	30	60.8	2.86	
Cedarrun				3.30	
Centerhall†	90	37	63.0	4.06	
Chambersburg†				3.08	
Coatesville	99	36	67.2	1.63	
Confluence†	97	33	63.6	2.56	
Coopersburg	95	42	66.4	2.07	
Davis Island Dam†				2.41	
Derry Station	93	31	64.6	2.62	
Doylestown				1.67	
Driftwood				3.66	
Dubois				3.38	
Duncannon				2.59	
Dushore	90			2.53	
Dyberry	91	29	58.6	3.14	
East Bloomsburg				2.46	
East Mauch Chunk	95	34	64.1	2.14	
Easton	90	40	63.7	2.49	
Edinboro *1	88[b]	28[c]	65.1[c]		
Ellwood Junction†				1.70	
Emporium	90	30	61.8	2.73	
Everett	93	32	63.5	1.55	
Farrandsville				4.63	
Forks of Neshaminy *1	90	45	65.3	1.31	
Franklin	92	24	61.4	0.77	
Frederick				1.22	
Freeport†				2.53	
Girardville				2.48	
Grampian	90	28	62.1	3.16	
Greensboro†	97			0.65	
Greenville	87	29	58.8	1.91	
Hallstead†	91	30	60.4	3.94	
Hamburg	97	37	67.0	1.83	
Hollidaysburg	100[d]	29[d]	64.0[d]	2.75	
Huntingdon *a*†	98	31	64.3	3.31	
Huntingdon *b*				3.29	
Indiana	92	31	66.2	2.90	
Irwin				1.45	
Johnstown†	96	34	64.5	3.55	
Karthaus				0.72	
Keating				3.93	
Kennett Square	97	40	66.9	1.63	
Lansdale				1.12	
Lawrenceville	89	29	60.0	2.44	
Lebanon	97	36	65.7	1.57	
Leroy†	88	34	60.8	3.08	
Lewisburg	96	35	64.6	2.01	
Lock Haven *a*†	96	35	66.2	4.21	
Lock Haven *b*				3.93	
Lock No. 4†				1.37	
Lycippus	94	34	66.4	2.34	
Pennsylvania—Cont'd.	°	°	°	*Ins.*	*Ins.*
Mifflin				2.95	
Oil City†				1.53	
Ottsville				1.88	
Parker†				1.39	
Philadelphia *b*	96	44	68.6	1.11	
Point Pleasant				1.24	
Pottstown	96	40	66.8	1.54	
Quakertown	95	35	63.6	1.50	
Reading[2]			63.8	1.54	
Renovo *a*				3.96	
Renovo *b*	93	34	63.7	2.69	
Ridgway†				2.55	
Saegerstown	92	25	60.4	1.55	T.
St. Marys	93	28	61.0	2.85	
Salem Corners	88	36	62.4	3.88	
Scranton	95	33	62.5	1.20	
Seisholtzville				2.02	
Selinsgrove	95	33	63.6	2.56	
Shawmont				1.60	
Shinglehouse	96	26	60.4	2.49	
Sinnamahoning				3.38	
Smiths Corners				2.05	
Somerset	95	28	63.5	1.38	
South Bethlehem	93	40	66.6		
South Eaton	90	35	61.6	2.24	
State College	92	36	63.7	3.60	
Sunbury				1.90	
Swarthmore	92	44	66.1	1.58	
Swiftwater	86	32	59.4	1.86	
Towanda	94	33	62.1	2.93	
Uniontown	91	33	63.4	1.92	
Warren†	89	31	61.1	1.63	
Wellsboro†	88	30	59.6	3.40	
West Chester	94	40	66.7	1.27	
West Newton†				2.17	
White Haven	92	31	60.7	1.25	
Wilkesbarre†	96	35	64.1	1.49	
Williamsport	91	37	63.0	2.99	
York†	95	35	65.0	2.73	
Rhode Island.					
Bristol	86	44	63.0	1.85	
Kingston	90	32	61.0	1.76	
Providence *a*	92	40	63.9	1.77	
South Carolina.					
Allendale†	98	43	73.6	3.89	
Anderson†				1.98	
Batesburg†	95	45	72.8	4.20	
Blackville†	100	47	74.4	4.07	
Camden†				3.33	
Central†	100	49	74.8		
Cheraw *a*†	98	46	72.8	1.16	
Cheraw *b*†				2.11	
Clemson College	99	47	72.6	1.52	
Conway†				3.64	
Darlington (near)				2.02	
Edisto†				4.14	
Effingham†				2.88	
Florence†	96	50	73.6	2.40	
Gaffney†				2.10	
Georgetown†	90	54	74.4	3.60	
Gillisonville†	96	47	73.4	5.32	
Greenville†	96	47	71.5	2.42	
Greenwood	94	46	73.7	3.04	
Holland	98	42	72.0	1.76	
Kingstree *a*†	97	49	73.4	4.83	
Kingstree *b*				4.83	
Little Mountain	100	45	74.6	2.05	
Longshore†	98	45	73.0	2.10	
Mount Carmel†				2.78	
Pinopolis *1	91	53	71.7	3.34	
Port Royal†	91	53	75.1	4.57	
St. Georges†	95	49	74.1	2.15	
St. Matthews†	99	48	72.6	5.52	
St. Stephens†				2.18	
Santuck†	96	46	71.4	2.06	
Shaws Fork *1	98	49	74.5	3.80	
Smiths Mills†				1.64	
Society Hill†	93	50	71.9	1.05	
Spartanburg	96	49	72.0	3.30	
Statesburg†	95	48	73.4	2.74	
Trenton	94	50	75.2	3.28	
Trial†	96	48	72.4	4.45	
Walhalla	95	42	69.6	0.80	
Winnsboro	97	46	75.1	1.10	
Yemassee†	95	49	74.0	3.37	
Yorkville	97	50	73.8	1.78	
South Dakota.					
Aberdeen†	102	29	67.6	2.19	
Alexandria†				1.59	
Armour†	101	34	71.2	1.77	
Ashcroft†	105	30	67.4	0.08	
Brookings†	94	31	66.4	3.17	
Canton	97	31	70.3	1.25	
Castlewood†	98	25	67.4	1.70	
Centerville				0.95	
Chamberlain†	100	38	71.6	1.73	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
South Dakota—Cont'd.	°	°	°	*Ins.*	*Ins.*
Clark	.....	.....	.....	1.09	
Cross†	98	25	63.0	0.20	
Doland	102	26	70.0	1.85	
Edgemont	.....	.....	.....	0.15	
Eureka	.....	.....	.....	0.15	
Farmingdale	.....	.....	.....	0.00	
Faulkton	99	32	66.2	0.52	
Flandreau	95	32	69.0	1.40	
Forestburg†	100	31	69.3	2.09	
Forest City	.....	.....	.....	0.00	
Fort Meade†	103	36	69.0	0.01	
Gann Valley*	100	33	68.2	1.01	
Gary	93	33	67.8	1.22	
Goodyville	102	25	68.0	0.56	
Greenwood	.....	.....	.....	2.04	
Highmore	102	34	72.4	0.41	
Hotch City†	100	32	70.7	0.42	
Hot Springs	92	27	65.7	0.60	
Howard†	98	33	69.8	3.57	
Ipswich	101	27	67.7	0.55	
Kimball†	100	37	71.5	2.47	
Leslie†	107	33	72.0	T.	
Mellette†	102	28	68.8	0.74	
Menno*	103	33	72.6	1.66	
Millbank	96	30	66.8	1.68	
Mitchell†	100	33	68.8	0.91	
Oelrichs†	99	33	68.5	0.40	
Parker†	98	30	69.5	1.25	
Parkston†	99	32	70.2	1.41	
Plankinton†	101	33	70.4	2.25	
Rochford	.....	.....	.....	0.34	
Rosebud	99	35	72.6	0.47	
Shiloh	104	32	64.2	0.07	
Silver City	.....	.....	.....	0.21	
Sioux Falls†	95	29	69.0	1.05	
Spearfish†	96	30	67.5	0.00	
Tyndall†	96	35	70.6	1.81	
Watertown	93	25	65.0	1.43	
Wentworth†	94	28	67.1	3.10	
Wessington Springs	97	35	65.5	1.50	
Tennessee.					
Andersonville	95	39	69.8	0.06	
Arlington†	98	36	74.6	0.00	
Arthur†	.....	.....	.....	0.18	
Ashwood*†	98	45	76.5	T.	
Benton (near)†	95	36	71.9	0.36	
Bluff City†	.....	.....	.....	2.07	
Bolivar†	99	36	74.0	0.00	
Bristol†	90	38	66.4	0.66	
Brownsville†	98	39	77.8	0.00	
Byrdstown	96	38	70.5	0.66	
Carthage†	.....	.....	.....	0.29	
Clarksville	97	40	74.6	T.	
Clinton†	.....	.....	.....	0.35	
Covington	99	40	77.0	0.00	
Decatur†	97	39	71.6	0.38	
Dyersburg	99	45	77.8	0.00	
Elizabethton†	98	38	70.0	2.71	
Elk Valley	95	38	69.0	0.66	
Erasmus	.....	.....	.....	0.51	
Fairmount*[1]	86[1]	50[1]	71.0[1]	0.33	
Florence†	96	40	73.6	0.89	
Franklin	99	37	74.0	0.84	
Grace	.....	.....	.....	1.06	
Greeneville†	96	39	69.4	1.20	
Harriman	93	39	70.0	0.19	
Hickory Withe	98	36	76.4	T.	
Hohenwald†	94	30	69.3	T.	
Jackson†	98	35	74.6	0.00	
Johnsonville†	96	30	73.0	0.00	
Jonesboro*[1]	89	40	65.7	1.06	
Kingston†	.....	.....	.....	0.16	
Liberty†	96	40	72.8	0.98	
Lynnville†	96	41	73.4	0.10	
McKenzie†	98	35	75.4	T.	
McMinnville†	93	39	71.2	0.20	
Milan†	100	36	76.4	T.	
Molino†	99	47	76.0	0.00	
New Market*[1]	96	48	71.4	3.19	
Newport†	95	39	70.4	0.59	
Nunnelly	96	33	71.8	0.82	
Oak Hill*[1]	98	37	68.4	0.87	
Palmetto†	97	40	74.8	0.62	
Peryear	100	34	74.0	0.21	
Pope	100	34	74.8	0.00	
Riddleton†	95	39	71.8	0.67	
Rogersville†	93	39	69.2	0.64	
Rugby	91	34	66.6	1.10	
St. Joseph†	102	33	74.2	0.00	
Savannah	101	34	75.8	T.	
Sewanee†	86	49	71.6	0.30	
Silver Lake	.....	.....	.....	0.98	
Springdale*[1]	92	36	67.7	0.42	
Springfield	100	36	75.2	0.00	
Sylvia	104	38	75.8	0.00	
Tellico Plains†	97	37	72.3	T.	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Tennessee—Cont'd.	°	°	°	*Ins.*	*Ins.*
Tracy City	93	34	68.3	0.16	
Trenton	97	35	73.8	T.	
Tullahoma†	95	36	70.8	0.05	
Union City†	.....	.....	.....	T.	
Waynesboro	99	38	75.0	0.00	
Texas.					
Albany*[1]	91	48	74.8	1.75	
Aransas Pass	93	58	78.4	1.18	
Arthur City†	.....	.....	.....	2.69	
Austin *a*	94	54	77.8	3.74	
Austin *b*[5]	94	49	77.6	.....	
Ballinger†	100	44	74.4	1.08	
Beeville†	98	46	79.3	1.70	
Blanco†	.....	.....	.....	1.75	
Boerne*[1]	91	53	74.7	3.29	
Brazoria†	91	48	75.9	3.11	
Brenham†	96	52	77.8	2.86	
Brighton†	92	50	79.4	0.43	
Brownwood	.....	.....	.....	2.40	
Burnet*[1]	93	52	75.6	4.78	
Camp Eagle Pass†	101	50	81.2	0.68	
Childress	98	48	75.8	2.01	
Coleman	94	47	72.7	1.36	
College Station	93	53[j]	75.5[e]	2.46	
Colmesneil	.....	.....	.....	3.03	
Columbia†	92	46	75.4	2.29	
Conroe	99	47	77.2	5.25	
Corsicana *b*†	99	52	78.6	2.58	
Cuero†	91	51	75.9	2.46	
Dallas†	101	49	76.9	1.75	
Danevang†	95	45	75.4	2.59	
Dublin†	96	50	74.1	3.14	
Duval*[1]	100	58	80.4	2.70	
Emory	103	43	75.5	3.97	
Estelle†	100	46	76.8	0.93	
Forestburg†	100	44	75.0	3.25	
Fort Brown	97	59	79.2	2.38	
Fort Clark	98	58	79.4	0.36	
Fort McIntosh	100	50	79.6	2.10	
Fort Ringgold†	94	48	78.0	2.26	
Fort Stockton	.....	.....	.....	1.40	
Fort Worth†	99[d]	51[d]	77.4[d]	1.68	
Fredericksburg*†[1]	94[d]	44	73.4[d]	2.20	
Fruitland	99	54	77.5	2.16	
Gainesville†	98	46	75.7	1.75	
Georgetown*[1]	95[c]	53[f]	73.8[g]	4.22	
Golindo	.....	.....	.....	3.65	
Grapevine†	98	47	76.4	2.15	
Hale Center†	89	51	70.5	1.25	
Hallettsville†	95	46	77.4	1.29	
Haskell*[1]	97	53	76.1	0.73	
Hearne†	98	52	78.7	1.60	
Henrietta†	101	51	77.6	0.96	
Hewitt	.....	.....	.....	3.20	
Houston†	93	50	76.6	5.07	
Huntsville†	97	46	76.4	3.44	
Jacksonville	100	42	76.2	1.99	
Junction City	99	42	73.7	0.05	
Kent	.....	.....	.....	2.25	
Kerrville	97	40	72.9	2.61	
Lampasas†	98	41	73.6	4.58	
Llano*† [b]	94	53	74.5	2.51	
Longview†	100	45	78.6	2.16	
Luling†	95	50	77.6	3.25	
Mann	102[f]	48[c]	79.9[d]	1.05	
Menardville	95	43	73.8	.....	
Midland	99	44	74 8	1.14	
Mount Blanco†	93	44	69.2	1.00	
New Braunfels†	94	48	77.1	1.24	
Orange†	95	47	74.8	2.06	
Panter	.....	.....	.....	3.96	
Paris†	104	49	77.8	1.90	
Point Isabel*[1]	90	72	82.2	0.10	
Rheinland†	100	53	76.6	1.44	
Roby	100[f]	48[f]	74.7[f]	0.66	
Rocksprings	.....	.....	.....	0.11	
Runge†	97	50	80.1	1.50	
San Antonio	96	52	79.4	1.78	
Sandersont	90	43	69.6	0.20	
San Marcos *b*†	95	45	76.5	1.49	
Stafford†	97	48	77.5	3.23	
Sulphur Springs†	104	44	79.2	1.90	
Temple *a*	95	52	76.2	3.43	
Temple *b*	95	48	76.4	2.65	
Tyler	99	46	76.6	2.68	
Valentine†	96	44	69.0	3.65	
Victoria	.....	.....	.....	2.05	
Waco†	98	49	78.9	2.38	
Waxahachie†	.....	47	.....	2.90	
Weatherford†	97	50	75.3	3.27	
Wichita Falls†	.....	.....	.....	2.40	
Utah.					
Alpine City†	.....	.....	.....	1.77	
Blue Creek*[5]	93	45	64.4	0.00	
Brigham City†	.....	.....	.....	0.91	
Cisco†[f]	95	49	70.2	1.40	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Utah—Cont'd.	°	°	°	*Ins.*	*Ins.*
Corinne	88	40	64.4	1.36	
Croydon	88	33	60.6	0.90	T.
Ferron	90	40	62.6	3.03	
Fillmore†	100	32	65.6	1.50	
Fort Duchesne†	91	40	62.0	4.61	
Frisco	84	46	63.8	1.21	T.
Giles†	97	45	67.6	1.02	
Heber	86	26	55.2	3.14	
Huntsville	.....	.....	.....	0.17	
Kelton*[5]	85	48	64.0	0.00	
Levan†	87	35	61.5	1.84	
Loa†	82	25	54.4	2.00	
Logan†	84	37	63.8	1.28	
Manti†	98	32	62.2	2.85	
Millville	.....	.....	.....	1.70	
Minersville	87	37	65.0	2.07	
Moab†	89	49	67.6	1.46	
Mount Pleasant†	95	33	64.6	2.66	
Ogden *a*[5]	92	45	64.6	0.55	
Ogden *b*	89	38	65.0	0.88	
Pahreah	94	42	65.3	2.20	
Park City†	74	30	54.0	0.28	
Parowan†	87	35	62.6	1.84	
Pinto	83	27	58.6	2.17	
Promontory*[1]	88	47	61.4	0.34	
Richfield†	87	28	56.2	1.45	
St. George†	100	39	72.8	1.00	
Scipio†	86	31	61.2	1.39	
Snowville	86	36	60.4	0.60	
Soldier Summit†[5]	88	27	54.8	2.45	
Terrace*[5]	89	45	68.8	1.50	
Tooele†	86[c]	42[c]	65.0[c]	0.18	
Tropic	80[f]	39[f]	57.5[f]	3.77	
Vernal	84	43	60.2	2.83	
Vermont.					
Brattleboro	87	33	59.4	1.91	
Burlington†	90	40	60.8	2.13	
Chelsea†	86	32	55.0	1.37	
Cornwall	89	35	58.5	1.65	
Enosburg Falls	89	32	56.7	2.02	
Hartland†	91	30	56.0	1.87	
Jacksonville	84	24	54.7	2.42	
St. Johnsbury	86	29	55.6	2.17	
Strafford*†[1]	83	36	56.6	1.25	
Vernon*[5]	88	33	59.7	2.13	
Wells	86	28	57.6	2.38	
Woodstock	90	29	54.8	1.99	
Virginia.					
Alexandria	95	42	68.2	1.53	
Ashland†	97	38	69.2	0.80	
Barboursville	93	39	68.4	0.80	
Bedford City	.....	.....	.....	1.00	
Bigstone Gap†	91	34	64.8	0.99	
Birdsnest*†	96	50	71.8	0.65	
Blacksburg	93	30	64.0	1.19	
Buckingham†	100	35	68.9	1.05	
Burkes Garden	.....	.....	.....	1.15	
Callaville†	94	39	69.4	1.67	
Christiansburg†	.....	.....	.....	2.13	
Clarksville	.....	.....	.....	0.25	
Clifton Forge	96	34	65.4	0.46	
Dale Enterprise†	98	30	66.0	0.43	
Doswell	97	35	68.1	0.70	
Dwale	.....	.....	.....	0.76	
Farmville	99	48	74.8	T.	
Fredericksburg†	94	41	70.2	0.68	
Gordonsville	94	38	70.2	.....	
Goshen	.....	.....	.....	1.60	
Grahams Forge	91	31	63.2	0.92	
Guinea	.....	.....	.....	0.47	
Hampton	92	52	73.1	0.78	
Hot Springs	91	32	64.1	0.63	
Leesburg	.....	35	.....	1.19	
Lexington†	97	32	67.9	1.09	
Maidens	.....	.....	.....	0.60	
Manassas†	96	36	69.2	0.80	
Marion†	90[c]	34[c]	65.5[c]	1.35	
Monterey	88	34	62.8	1.20	
Nottoway	102[h]	36	71.4	0.75	
Petersburg†	99	38	73.6	1.69	
Richmond (near)†	101	43	72.2	0.86	
Rockymount†	96	40	71.2	1.02	
Salem†	97	.....	.....	2.56	
Speers Ferry	.....	.....	.....	0.47	
Spottsville†	95	37	70.4	2.03	
Stanardsville†	96	38	69.0	0.65	
Staunton†	96	32	67.2	0.73	
Stephens City†	98	35	68.4	1.43	
Sunbeam†	94	39	70.2	1.02	
Swords Creek	91	32	64.0	0.30	
Warrenton	91	48	70.4	0.86	
Warsaw†	95	41	69.8	0.54	
Woodstock†	98[f]	33	67.9[c]	1.38	
Wytheville†	93	37	66.8	0.92	
Washington.					
Aberdeen	85	37	57.2	1.77	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Washington—Cont'd.	°	°	°	*Ins.*	*Ins.*
Anacortes	.....	.....	.....	1.55	
Ashford †	.....	.....	.....	2.62	
Blaine †...	74	25	51.2	2.21	
Cascade Tunnel	84	30	53.3	.....	
Centerville †	97	29	59.2	1.01	
Chehalis †	90	38	57.4	2.00	
Clearwater	82	28	57.3	3.15	
Colfax †	87	31	55.8	2.25	
Coupeville †	75	36	54.6	1.37	
Dayton	87	38	60.0	1.55	
Ellensburg	81	27	57.0	0.19	
Ellensburg (near)	88	30	57.0	0.02	
Fort Simcoe †	96	36	62.5	0.48	
Fort Spokane	89	31	57.2	1.17	
Grandmound †	86	35	56.4	2.00	
Hunters †	78	27	50.1	1.11	
Kennewick †	92	35	63.2	0.54	
La Center	85	38	58.1	3.44	
Lakeside	82	39	61.2	0.11	
Lapush	70	41	54.4	3.27	
Lind	95	33	61.9	0.23	
Loomis †	88	35	59.2	0.75	
Madrone †	76	40	55.6	2.04	
Mayfield †	84	37	57.4	3.95	
Moxee Valley †	89	31	59.1	0.43	
New Whatcom	75	34	56.5	2.49	
Olga	67	37	53.6	2.87	
Olympia †	81	32	56.7	2.62	
Pinehill †	86	36	59.4	0.92	
Pomeroy	96	46	61.8	2.07	
Port Townsend	79	43	56.8	1.30	
Pullman †	90	38	58.0	1.86	
Rosalia †	87	31	55.2	2.08	
Sedro †	86	36	58.6	2.01	
Shoalwater Bay *[10]	72	43	57.6	.....	
Snohomish †	79	42	58.5	7.90	
Southbend	85	34	58.4	2.65	
Stampede	85	35	54.6	1.86	
Sunnyside †	91	34	59.9	0.21	
Union City †	82	40	56.8	3.16	
Vashon †	76	41	55.5	2.17	
Waterville †	85	26	55.0	0.44	
Wenatchee Lake	89	24	52.2	0.30	
West Virginia.					
Beckley	89	29	58.9	0.00	
Beverly †	97	34	65.6	2.15	
Bluefield †	94	34	66.6	0.62	
Buckhannon *a* †	.....	.....	.....	2.79	
Buckhannon *b*	93	31	61.2	.....	
Burlington †	98	31	64.4	1.67	
Charleston †	.....	.....	.....	0.59	
Dayton †	93	32	64.3	0.49	
Eastbank	96	41	69.8	0.52	
Elkhorn †	91	36	66.4	1.19	
Fairmont †	.....	.....	.....	0.62	
Glenville †	92	36	65.2	1.61	
Grafton †	98	32	65.5	0.65	
Green Sulphur	92	34	65.0	0.02	
Harpers Ferry †	.....	.....	.....	1.57	
Hewett †	.....	32	.....	0.55	
Hinton *a* †	.....	.....	.....	0.34	
Hinton *b* †	94	38	66.0	.....	
Kingwood	89	31	60.1	0.85	
Marlinton †	87	30	60.9	0.80	
Martinsburg †	98	36	66.8	1.80	
Morgantown *b* †	99	33	67.8	1.23	
New Martinsville †	99	33	67.5	0.55	
Nuttallburg †	93	42	70.4	0.80	
Oldfields †	97	30	65.5	1.30	
Philippi †	89	43	65.9	4.00	
Point Pleasant †	98	38	71.2	1.40	
Powellton	92	37	65.3	0.61	
Romney	94	35	66.1	2.35	
Rowlesburg †	.....	.....	.....	1.95	
Upper Tract	102	32	72.2	0.09	
Weston *a*	.....	.....	.....	1.64	
Weston *b* *†	98	40	65.7	.....	
Wheeling *a* †	.....	.....	.....	0.61	
Wheeling *b* †	95	36	66.6	0.85	
White Sulphur Springs †	97	27	63.0	0.45	
Wisconsin.					
Amherst	94	27	64.2	1.96	
Antigo	92	22	64.0	2.39	
Barron	89	22	61.8	2.93	
Bayfield	93	34	66.1	2.86	
Beloit	94	36	69.2	1.26	
Butternut	94	23	64.5	2.38	
Chilton	97	34	68.0	3.90	
Citypoint	93	42	68.4	2.47	
Delavan	97	30	67.8	1.11	
Dodgeville †	94	30	66.8	1.43	
Easton †	92	26	66.0	1.47	
Florence †	89	24	60.6	1.42	
Fond du Lac	95	36	65.9	3.34	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Wisconsin—Cont'd.	°	°	°	*Ins.*	*Ins.*
Grand River Locks	.....	.....	.....	4.29	
Grantsburg †	90	26	64.2	3.65	
Gratiot	94	32	68.0	2.75	
Hartford °	88	31	63.0	1.06	
Hartland	96	35	66.8	1.74	
Harvey	96	33	67.4	1.18	
Hillsboro	94	25	65.0	1.19	
Hudson	.....	.....	.....	1.63	
Koepenick *†	88	40	64.4	2.60	
Lancaster †	93	34	67.5	3.84	
Lincoln †	96	36	66.0	1.98	
Madison †	90	40	67.8	1.73	
Manitowoc †	87	37	62.8	3.32	
Meadow Valley †	94	25	65.0	2.03	
Medford †	94	28	62.3	1.90	
Menasha	.....	.....	.....	3.29	
Neillsville †	90	26	64.2	1.64	
New Holstein	94	32	67.0	4.50	
New London	92	31	63.8	2.11	
Oconto	94	31	64.8	2.07	
Osceola †	94	27	65.1	3.76	
Oshkosh †	93	33	66.7	3.70	
Pepin	92	28	67.4	1.32	
Pine River †	95	31	65.8	1.75	
Portage †	91	31	64.0	2.38	
Port Washington	92	35	65.7	0.72	
Prairie du Chien	96	34	70.6	6.58	
Racine	96	40	67.6	1.29	
Sharon	97	29	66.6	1.14	
Shawano	93	28	62.6	1.56	
Sheboygan *[10]	84	38	63.0	.....	
Spooner †	95	28	65.0	3.60	
Stevens Point †	93	27	64.0	2.26	
Sturgeon Bay Canal *[10]	84	38	61.6	.....	
Two Rivers *[10]	79	38	64.0	.....	
Valley Junction †	93	24	64.6	2.59	
Viroqua	90	33	66.6	1.66	
Watertown †	94	33	66.0	1.01	
Waukesha †	92	38	67.0	1.35	
Waupaca †	95	31	65.7	2.03	
Wausau †	91	27	63.2	2.76	
Wausaukee	95	34	63.8	1.60	
Westbend	92	36	65.3	2.02	
Westfield †	93	32	65.4	1.49	
Whitehall	93	28	65.7	1.85	
White Mound †	97	25	66.4	1.80	
Wyoming.					
Big Horn Ranch	83	25	56.9	0.82	
Carbon	99	27	61.7	0.22	
Fort Laramie †	99	31	67.2	1.14	
Fort Washakie	87	31	58.8	0.11	
Fort Yellowstone †	81	26	55.2	0.31	
Laramie	83	25	56.9	0.32	T.
Lusk †	95	27	63.8	0.74	
Sheridan	94	28	61.6	0.20	
Strong	94	29	61.0	0.08	
Sundance	95	25	63.7	0.43	
Wheatland	97	30	67.4	T.	
Mexico.					
Ciudad P. Diaz	92	56	79.8	0.75	
Leon de Aldamas	80	43	65.0	2.48	
New Brunswick.					
St. John	80	39	55.1	1.67	
West Indies.					
Grand Turk Island	.....	.....	.....	1.59	

Late reports for August, 1897.

Alabama.					
Evergreen	96	63	78.2	8.44	
Alaska.					
Coal Harbor	69	40	53.8	1.46	
Arkansas.					
Blackton	.....	.....	.....	2.00	
Moore	.....	.....	.....	8.09	
California.					
Trinidad L. H	.....	.....	.....	0.05	
Colorado.					
Cope	96	48	71.2	3.00	
Lay	92	33	66.6	0.87	
Idaho.					
Oakley	98	46	73.8	0.40	
Iowa.					
Lemars	91	41	68.0	2.60	
Wilton Junction	.....	.....	.....	2.58	
Maine.					
Flagstaff	85	34	60.6	5.01	
Michigan.					
Grand Point au Sable *[10]	85	48	64.6	.....	
Hammonds Bay *[10]	86	40	62.6	.....	
Ottawa Point *[10]	86	49	68.3		

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Minnesota.	°	°	°	*Ins.*	*Ins.*
Bingham Lake	90	54	75.6	.....	
Lutsen	77	38	60.5	2.86	
Pleasant Mounds	83[5]	46[5]	65.7[5]	5.13	
St. Cloud	.....	.....	.....	2.48	
Zumbrota [7]	86*	35	65.5	.....	
Mississippi.					
Enterprise	102	62	81.0	11.77	
Hernando	102	60	80.2	3.00	
Missouri.					
Appleton City	100	53	76.3	2.37	
Pickering *[3]	101	42	68.6	3.40	
Richmond	99	53	73.8	4.54	
Shelbina	.....	.....	.....	1.80	
Montana.					
Castle	88	26	59.4	0.17	
Choteau	98	36	66.8	0.20	
Columbia Falls	95	32	68.8	0.00	
Nebraska.					
State Farm	98	44	74.8	1.85	
New Jersey.					
South Orange	85	52	69.8	7.08	
New York.					
Alfred	86	40	62.0	1.78	
North Carolina.					
Horse Cove	90	54	71.6	1.83	
North Dakota.					
Fort Berthold	100	36	69.6	0.11	
Ohio.					
Kenton	.....	.....	.....	2.91	
Pennsylvania.					
Warren	....	[6]	.....	4.09	
Rhode Island.					
Bristol	80	55	68.6	5.02	
South Carolina.					
Gillisonville	.....	.....	.....	5.70	
South Dakota.					
Faulkton	93	40	65.3	2.18	
Washington.					
Shoalwater Bay *[10]	80	53	61.3	.....	
Wisconsin.					
Two Rivers *[10]	81	38	66.9	.....	

EXPLANATION OF SIGNS.

* Extremes of temperature from observed readings of dry thermometer.

† Weather Bureau instruments.

‡ Record furnished by the Arrowhead Reservoir Company, in the San Bernardino Mountains, San Bernardino County, Cal., at elevations varying from 5,150 to 5,350 feet.

A numeral following the name of a station indicates the hours of observation from which the mean temperature was obtained, thus:

[1] Mean of 7 a. m. + 2 p. m. + 9 p. m. + 9 p. m. ÷ 4.
[2] Mean of 8 a. m. + 8 p. m. ÷ 2.
[3] Mean of 7 a. m. + 7 p. m. ÷ 2.
[4] Mean of 6 a. m. + 6 p. m. ÷ 2.
[5] Mean of 7 a. m. + 2 p. m. ÷ 2.
[6] Mean of readings at various hours reduced to true daily mean by special tables.
[7] Mean from hourly readings of thermograph.
[8] Mean of 7 a. m. + 2 p. m. + 9 p. m. ÷ 3.
[9] Mean of sunrise and noon.
[10] Mean of sunrise, noon, sunset, and midnight.

The absence of a numeral indicates that the mean temperature has been obtained from daily readings of the maximum and minimum thermometers.

An italic letter following the name of a station, as "Livingston *a*," "Livingston *b*," indicates that two or more observers, as the case may be, are reporting from the same station. A small roman letter following the name of a station, or in figure columns, indicates the number of days missing from the record; for instance, "[5]" denotes 14 days missing.

No note is made of breaks in the continuity of temperature records when the same do not exceed two days. All known breaks, of whatever duration, in the precipitation record receive appropriate notice.

CORRECTIONS.

North Carolina, Horse Cove, April, 1897, strike out all data and enter 79, 31, 53.8, and 10.52.

South Dakota, Millbank, August, 1897, make mean temperature read 64.5 instead of 65.6.

August, 1897, Review, page 356, in table of Mexican data, make altitude of Pueblo read 7,112 instead of 2,168.

Monthly Weather Review for December, 1890, p. 321, interchange the meteorological data published on the lines for Erie and Detroit.

April, 1897, Vol. XXV, p. 135, line 11 from bottom, for Bedford read Bradford.

TABLE III.—*Data from Canadian stations for the month of September, 1897.*

Stations.	Pressure.			Temperature.		Precipitation.		Prevailing direction of wind.	Total depth of snow.
	Mean not reduced.	Mean reduced.	Departure from normal.	Mean.	Departure from normal.	Total.	Departure from normal.		
	Inches.	*Inches.*	*Inches.*	°	°	*Inches*	*Inches.*		
St. Johns, N. F	29.70	29.84	— .15	53.2	— 0.8	7.08	.....	s.	
Sydney, C. B. I	29.92	29.98	— .05	55.4	— 1.1	3.66	+ 0.42	nw.	
Grindstone, G. St. L.	.....	.....	.....	.....	.....	.....	.....	.....	
Halifax, N. S	29.92	30.05	.00	56.2	— 1.4	1.17	— 2.38	w.	
Grand Manan, N. B.	29.98	30.03	— .01	55.4	— 0.7	1.52	— 0.28	w.	
Yarmouth, N. S.	30.00	30.08	+ .01	54.6	— 1.5	1.26	— 1.33	nw.	
Charlottet'n, P. E. I.	29.94	29.98	— .04	55.4	— 1.9	3.29	+ 0.43	nw.	
Chatham, N. B	29.97	29.99	— .02	53.8	— 1.6	3.91	+ 1.19	w.	
Father Point, Que.	29.97	30.00	+ .02	48.0	— 2.4	3.00	+ 0.20	w.	
Quebec, Que	29.74	30.07	+ .05	53.0	— 2.1	2.09	+ 1.58	w.	
Montreal, Que	29.89	30.09	+ .06	57.1	— 1.3	1.15	— 2.08	sw.	
Rockliffe, Ont	29.62	30.13	+ .10	52.8	— 0.9	0.55	— 3.15	nw.	
Kingston, Ont	29.82	30.13	+ .09	59.6	— 0.4	0.81	— 1.96	sw.	
Toronto, Ont	29.78	30.16	+ .10	59.0	0.0	0.39	— 2.36	nw.	
White River, Ont	28.77	30.11	+ .12	50.9	+ 0.6	1.29	— 1.79	s.	
Port Stanley, Ont	29.54	30.17	+ .12	58.6	— 0.9	0.44	— 2.21	sw.	
Saugeen, Ont	29.46	30.16	+ .12	58.6	+ 1.1	0.60	— 2.91	s.	
Parry Sound, Ont	29.46	30.15	+ .12	56.2	+ 0.2	0.48	— 3.85	w.	
Port Arthur, Ont	29.36	30.05	+ .09	55.0	+ 2.8	1.12	— 2.35	w.	
Winnipeg, Man	29.14	29.95	+ .03	57.0	+ 4.5	0.34	— 1.66	se.	
Minnedosa, Man	28.18	29.95	+ .03	56.3	+ 5.8	0.32	— 1.10	w.	
Qu'Appelle, Assin	27.70	29.92	.00	56.2	+ 5.1	0.31	— 0.83	nw.	
Medicine Hat, Assin	27.66	29.93	+ .05	56.2	+ 1.2	2.15	+ 1.30	w.	
Swift Curr't, Assin.	27.41	29.95	+ .01	55.0	+ 1.9	2.60	+ 1.47	w.	
Calgary, Alberta	26.42	29.93	+ .03	49.8	0.0	1.04	+ 0.14	w.	
Prince Albert, Sask.	28.33	29.82	.....	51.8	+ 3.4	2.94	.....	nw.	
Edmonton, Alberta.	27.62	29.94	+ .05	50.4	+ 1.1	0.98	— 0.51	se.	
Battleford, Sask	28.20	29.91	... .	54.0	+ 2.2	3.27	.....	w.	
Kamloops, B. C.	28.57	29.79	.....	57.8	.....	0.99	.....	sw.	
Hamilton, Bermuda	29.97	30.13	+ .06	77.6	+ 0.2	3.19	.....	n.	
Banff, Alberta	25.38	29.92	... .	45.4	.....	0.59	.....	sw.	
Esquimalt, B. C.	30.01	30.04	.....	52.7	— 0.7	1.81	.....	s.	
Ottawa, Ont	29.80	30.15	.....	56.4	— 1.0	0.45	....	sw.	

TABLE IV.—*Meteorological observations at Honolulu, Republic of Hawaii, by Curtis J. Lyons, Meteorologist to the Government Survey.*

Pressure is corrected for temperature and reduced to sea level, but the gravity correction, —0.06, is still to be applied.

The average direction and force of the wind and the average cloudiness for the whole day are given unless they have varied more than usual, in which case the extremes are given. The scale of wind force is 0 to 10. Two directions of wind, connected by a dash, indicate change from one to the other; also same for force.

The rainfall for twenty-four hours is given as measured at 6 a. m. on the respective dates.

September, 1897.	Pressure at sea level.			Temperature.					Relative humidity.			Wind.		Cloudiness.	Rain measured at 6 a. m.
	6 a. m.	3 p. m.	9 p. m.	6 a. m.	2 p. m.	9 p. m.	Maximum.	Minimum.	6 a. m.	2 p. m.	9 p. m.	Direction.	Force.		
	Ins.	*Ins.*	*Ins.*	°	°	°	°	°	%	%	%				*Ins.*
1	30.05	30.00	30.11	74	81	76	84	72	70	61	70	ene.	2	4	0.08
2	30.04	29.97	30.04	74	82	76	86	70	82	55	70	ene.	2	3	0.17
3	30.04	29.98	30.05	76	81	74	85	74	74	61	88	ne.	2	4	0.05
4	30.05	29.98	30.06	74	81	78	84	71	82	65	71	ne.	3	6	0.03
5	30.05	30.00	30.04	77	81	77	85	75	67	54	71	ene.	3	3	0.02
6	30.05	29.98	30.06	74	81	74	85	72	74	68	82	ene.	1	3	0.05
7	30.05	29.98	30.05	76	81	75	85	73	74	61	74	ne.	1	5	0.02
8	30.03	29.99	30.05	74	82	76	85	72	74	58	74	ene.	2	3	0.05
9	30.07	30.01	30.09	76	82	76	86	72	74	62	87	ene.	2	3	0.00
10	30.05	30.02	30.08	76	82	76	86	71	87	72	82	ne.	1	10	0.16
11	30.07	30.03	30.09	75	82	71	85	75	70	58	91	ne.	2	3	0.07
12	30.04	29.97	30.03	74	81	72	85	72	70	54	86	ne.	2–3	4	0.01
13	30.01	29.94	30.03	73	82	76	83	68	82	58	70	ene.	3	3	0.41
14	30.02	30.01	30.08	73	79	76	82	71	82	60	70	ene.	3–4	4	0.14
15	30.11	30.03	30.09	75	81	76	83	75	74	61	70	nne.	2	3	0.11
16	30.04	29.99	30.03	73	81	75	85	70	73	61	74	ne.	1	4	0.01
17	29.99	29.94	29.99	69	81	74	85	67	90	61	74	ene.	2	3	0.03
18	29.97	29.95	30.00	73	79	72	83	67	82	68	86	s.	1	5	0.07
19	29.98	29.93	30.01	71	76	73	80	66	81	82	86	s.	1	10	0.07
20	30.05	29.98	30.05	74	82	76	85	68	82	65	74	ene.	2	5	1.64
21	30.06	30.00	30.05	75	81	76	84	74	74	61	78	ene.	2	4	0.03
22	30.02	29.97	30.03	75	81	76	83	74	74	61	70	ne.	2	7	0.01
23	29.99	29.96	30.03	75	80	76	83	74	78	68	70	ene.	2	8–3	0.02
24	30.03	29.96	30.07	75	82	75	84	73	74	65	74	ene.	2	3	0.01
25	30.04	30.02	30.08	75	81	75	83	71	74	61	74	ene.	2	3	0.07
26	30.05	30.03	30.09	74	81	74	84	73	74	61	70	ene.	2	5	0.03
27	30.04	29.97	30.08	73	81	78	84	72	82	68	75	ene.	2	5	0.04
28	30.06	30.01	30.10	73	80	78	87	70	91	68	75	ene.	1–3	4–9	0.00
29	30.08	30.05	30.11	75	81	78	87	70	71	68	79	ene.	4	9	0.00
30	30.09	30.05	30.11	75	80	77	86	70	74	61	71	ene.	4	7	0.01
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	30.07	29.99	30.06	74.2	80.9	75.4	84.4	71.4	76.7	63.1	76.4	ene.	2.0	4.8	3.41

Mean temperature: 6+2+9+3 is 76.7°; extreme temperatures 87° and 66°.

TABLE V.—*Mean temperature for each hour of seventy-fifth meridian time, September*, 1897.

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Bismarck, N Dak.....	61.3	59.6	57.8	56.3	55.5	54.6	53.9	53.6	56.2	60.9	66.1	70.6	73.9	76.8	78.9	80.2	80.4	80.0	78.4	74.7	70.3	67.5	64.7	62.5	66.4
Boston, Mass.	59.1	58.4	57.6	57.2	56.7	56.5	57.6	60.0	62.2	63.9	65.9	67.3	68.6	69.6	69.7	68.6	67.9	66.6	64.6	63.0	62.3	61.4	60.5	59.9	62.7
Buffalo N Y.....	60.4	59.9	59.8	59.2	58.9	58.9	60.1	61.0	63.2	64.8	65.9	67.2	68.0	68.7	68.8	68.7	68.0	66.8	65.3	64.5	63.2	62.4	61.9	61.3	63.6
Chicago, Ill.....	68.5	67.5	66.6	65.7	64.8	63.7	63.1	64.7	65 9	68.7	70.6	72.2	72.3	72.7	72.9	73.4	74.0	74.0	73.1	71.8	71.2	70.8	70.2	69.5	69.5
Cincinnati, Ohio.....	66.4	64.5	63.3	62.0	61.0	59.9	58.9	60.7	64.2	69.2	73.7	77.6	79.6	81.5	82.7	83.2	83.5	82.2	80.3	77.6	75.5	72.6	70.3	67.7	71.6
Cleveland, Ohio	61.9	60.9	60.1	59.9	59.1	58.9	58.6	60.0	64.9	67.3	69.3	69.7	69.9	70.0	70.4	70.2	71.1	70.5	69.9	68.8	66.7	65.2	63.8	62.8	65.4
Detroit, Mich.....	61.8	61.2	60.3	59.5	59.0	58.6	58.4	60.1	63.2	66.3	69.3	71.3	73.1	74.0	73.9	73.9	73.3	72.8	70.2	67.9	66.1	64.9	63.6	62.6	66.1
Dodge City, Kans.....	67.8	66.8	65.4	64.3	63.2	61.5	60.7	60.0	64.1	70.9	76.1	79.8	82.2	83.7	84.5	85.2	84.4	83.8	81.8	77.4	73.9	71.5	69.6	68.5	72.8
Eastport, Me.....	52.0	51.5	51.2	50.8	50.6	50.6	51.7	53.1	55.7	57.5	58.4	59.4	60.0	59.7	60.0	59.3	58.2	56.8	55.7	54.7	54.1	53.6	53.0	52.5	55.0
Galveston, Tex.....	78.5	78.1	77.6	77.2	76.6	76.3	75.9	76.1	76.3	77.1	78.6	79.7	80.9	81.6	82.5	82.8	82.8	82.0	81.6	80.6	80.0	79.6	79.2	78.8	79.2
Havre, Mont.....	54.5	53.0	51.9	51.0	49.5	48.4	46.5	45.7	45.4	49.9	56.2	60.8	64.2	67.4	70.3	72.5	73.5	74.3	73.5	71.4	66.5	63.0	59.4	56.7	59.4
Kansas City, Mo.....	73.0	71.8	70.7	69.7	68.8	67.9	66.9	66.6	69.5	73.5	77.3	80.7	82.8	84.7	86.1	86.7	87.2	86.9	85.3	82.5	79.9	77.7	75.8	74.5	76.9
Key West, Fla.....	79.5	79.3	79.1	79.1	79.2	79.1	79.8	80.8	81.6	82.1	82.6	82.5	82.4	82.7	82.1	82.1	81.7	80.8	80.1	80.2	79.9	79.6	79.4	79.3	80.6
Memphis, Tenn.....	74.5	73.6	72.5	71.4	70.3	69.6	68.5	68.8	71.4	74.5	78.7	81.3	83.5	85.0	86.2	87.2	87.4	86.9	83.9	82.6	80.6	78.9	77.5	76.1	78.0
New Orleans, La.....	75.2	74.9	74.7	74.3	74.0	73.3	73.2	73.8	76.4	78.6	81.1	82.4	83.3	84.7	85.2	84.7	84.4	83.1	81.0	79.5	78.1	77.3	76.5	75.8	78.6
New York, N. Y.....	62.5	62.0	61.4	61.1	60.4	59.7	59.9	61.2	62.6	64.5	66.4	68.0	69.8	71.0	71.5	71.5	71.0	69.1	67.9	67.2	65.8	64.7	63.9	63.1	65.3
Philadelphia, Pa.....	63.8	62.7	62.1	61.4	60.8	60.6	61.9	64.1	66.7	69.3	71.5	73.6	75.3	76.2	76.8	76.8	75.9	73.6	71.4	69.8	67.9	66.4	65.5	64.7	68.3
Pittsburg, Pa.....	61.4	60.2	59.2	58.3	57.4	56.7	56.5	58.5	61.1	65.4	69.9	73.8	75.9	77.2	78.3	78.2	77.7	76.7	73.9	71.3	68.7	65.9	64.2	62.5	67.0
Portland, Oreg.....	59.1	58.0	56.9	55.7	54.9	54.0	53.3	53.2	52.2	52.4	53.8	55.6	57.1	59.2	61.7	64.0	66.1	67.2	67.4	66.1	65.3	63.2	61.7	60.1	59.1
St. Louis, Mo.....	73.5	72.2	70.9	70.0	68.6	67.6	66.6	68.0	69.9	73.2	78.2	81.8	83.8	86.0	87.2	88.0	87.7	87.0	84.8	82.5	80.1	78.4	76.5	74.8	77.4
St. Paul, Minn.....	63.1	62.3	61.6	61.1	60.2	59.5	58.6	58.7	60.4	63.5	67.1	70.3	73.2	74.4	75.7	76.5	77.1	76.0	74.0	71.5	68.9	66.9	65.7	64.7	67.1
Salt Lake City, Utah..	63.2	61.1	61.1	60.1	59.2	59.0	58.3	57.9	58.4	60.8	65.5	69.3	71.8	73.6	74.5	75.7	76.3	77.0	76.2	74.7	71.6	68.3	66.2	64.6	66.9
San Diego, Cal.....	66.0	65.4	65.2	64.9	64.8	64.6	64.4	64.4	64.2	65.0	66.5	69.1	70.6	71.3	71.7	72.1	71.6	71.8	70.7	69.8	68.2	67.4	66.8	66.4	67.6
San Francisco, Cal....	57.7	57.4	56.7	56.4	56.4	56.0	55.9	55.6	55.3	55.6	57.1	58.7	61.6	63.7	65.1	65.6	65.3	64.5	63.5	62.2	60.6	59.2	58.5	58.1	59.4
Savannah, Ga.....	70.2	69.6	69.3	68.9	68.4	67.8	68.0	70.5	73.3	75.9	77.7	79.0	79.0	79.4	79.6	78.6	77.7	76.2	74.4	73.3	72.5	72.0	71.5	70.7	73.5
Washington, D. C....	62.7	62.0	61.0	60.0	59.3	58.4	59.2	62.5	66.7	70.1	72.9	75.0	77.1	78.2	78.8	78.6	77.5	75.0	71.5	68.8	66.7	65.3	63.7	62.7	68.1

TABLE VI.—*Mean pressure for each hour of seventy-fifth meridian time, September*, 1897.

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Bismarck, N. Dak...	28.244	.249	.251	.253	.254	.258	.264	.272	.278	.280	.280	.276	.262	.249	.235	.222	.212	.207	.211	.214	.225	.237	.245	.252	.247
Boston, Mass.....	29.968	.967	.967	.971	.978	.987	.994	.997	.997	.992	.984	.974	.963	.951	.946	.943	.945	.949	.958	.965	.969	.970	.970	.969	.970
Buffalo, N. Y.....	29.334	.334	.333	.335	.343	.352	.362	.365	.372	.375	.370	.366	.355	.345	.335	.329	.328	.326	.330	.336	.341	.340	.342	.342	.345
Chicago, Ill.....	29.277	.278	.281	.283	.288	.296	.305	.314	.321	.321	.319	.312	.301	.290	.278	.268	.261	.260	.260	.263	.276	.282	.283	.284	.288
Cincinnati, Ohio ...	29.495	.496	.495	.499	.507	.517	.531	.542	.547	.551	.548	.535	.523	.502	.487	.473	.467	.470	.469	.477	.487	.492	.499	.503	.505
Cleveland, Ohio	29.350	.349	.350	.354	.359	.370	.379	.386	.396	.398	.396	.392	.381	.369	.353	.346	.340	.338	.342	.344	.351	.354	.355	.358	.363
Detroit, Mich.....	29.385	.388	.388	.388	.394	.402	.415	.421	.427	.429	.421	.415	.404	.395	.379	.375	.369	.370	.378	.379	.387	.390	.392	.393	.395
Dodge City, Kans..	27.501	.506	.504	.506	.506	.510	.517	.525	.536	.543	.549	.543	.529	.516	.497	.479	.468	.465	.465	.472	.481	.494	.504	.510	.505
Eastport, Me.....	29.942	.943	.942	.944	.950	.959	.965	.971	.971	.968	.962	.952	.943	.934	.925	.923	.923	.929	.939	.943	.944	.945	.945	.945	.946
Galveston, Tex.....	30.028	.027	.023	.022	.024	.031	.042	.052	.061	.069	.072	.073	.062	.046	.032	.019	.010	.009	.011	.014	.022	.031	.034	.035	.035
Havre, Mont.....	27.348	.351	.355	.359	.363	.364	.369	.376	.384	.387	.385	.382	.371	.360	.347	.335	.323	.318	.313	.311	.325	.337	.344	.347	.352
Kansas City, Mo....	29.111	.114	.115	.119	.128	.137	.147	.155	.168	.175	.176	.167	.154	.136	.115	.100	.087	.079	.075	.081	.097	.106	.110	.117	.124
Key West, Fla.....	29.982	.971	.964	.961	.965	.972	.985	.996	.009	.014	.015	.010	.996	.976	.959	.952	.952	.958	.968	.982	.992	.998	.997	.991	.982
Memphis, Tenn.....	29.698	.698	.696	.696	.700	.708	.724	.738	.753	.764	.767	.763	.746	.727	.707	.687	.674	.671	.670	.673	.684	.694	.701	.705	.710
New Orleans, La....	29.998	.991	.985	.983	.988	.997	.009	.019	.028	.034	.034	.027	.015	.996	.981	.972	.967	.973	.978	.987	.002	.009	.010	.006	.000
New York, N. Y....	29.804	.801	.798	.797	.805	.812	.822	.826	.828	.826	.821	.813	.802	.791	.781	.778	.778	.782	.791	.796	.804	.809	.811	.810	.804
Philadelphia, Pa....	30.016	.018	.016	.018	.024	.032	.042	.050	.053	.050	.046	.035	.022	.009	.999	.992	.995	.995	.004	.014	.019	.021	.023	.025	.022
Pittsburg, Pa*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Portland, Oreg.....	29.875	.878	.882	.884	.885	.888	.889	.889	.894	.900	.906	.911	.910	.906	.897	.888	.874	.865	.857	.854	.854	.857	.864	.871	.882
St. Louis, Mo.....	29.530	.532	.534	.537	.546	.556	.570	.583	.590	.593	.590	.583	.565	.547	.526	.515	.504	.502	.504	.508	.525	.530	.535	.538	.543
St. Paul, Minn.....	29.174	.177	.178	.180	.186	.192	.202	.209	.215	.215	.219	.214	.203	.191	.178	.168	.161	.155	.155	.156	.168	.173	.179	.182	.185
Salt Lake City, Utah	25.687	.692	.694	.693	.695	.697	.706	.713	.727	.734	.742	.744	.738	.727	.713	.697	.678	.666	.660	.655	.659	.669	.678	.685	.698
San Diego, Cal.....	29.845	.846	.845	.843	.838	.835	.833	.835	.840	.853	.863	.871	.870	.866	.855	.841	.830	.824	.819	.818	.821	.829	.842	.850	.842
San Francisco, Cal..	29.850	.848	.850	.849	.846	.846	.848	.853	.866	.878	.888	.893	.893	.887	.875	.862	.847	.835	.828	.822	.823	.831	.846	.853	.855
Savannah, Ga.....	30.023	.016	.008	.008	.014	.026	.039	.046	.059	.065	.060	.055	.041	.024	.013	.008	.010	.014	.017	.025	.035	.038	.039	.035	.030
Washington, D. C...	30.039	.035	.035	.037	.045	.053	.063	.072	.079	.079	.074	.062	.043	.029	.016	.010	.008	.008	.013	.023	.030	.036	.041	.042	.041

*Record incomplete.

TABLE VII.—*Average wind movement for each hour of seventy-fifth meridian time, September*, 1897.

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Abilene, Tex.	6.1	6.3	5.8	6.0	5.2	4.8	4.3	4.4	4.2	5.6	7.1	8.2	9.0	9.2	9.4	9.9	9.6	10.4	9.9	8.8	8.4	7.0	6.6	6.2	7.2
Albany, N. Y.	4.3	4.7	4.9	4.9	4.8	4.6	5.2	6.3	7.3	7.5	8.4	9.6	10.4	10.3	9.7	8.9	8.1	6.7	5.6	5.3	4.6	4.5	4.5	4.5	6.5
Alpena, Mich.	5.8	6.1	5.9	5.6	5.8	5.6	5.3	6.0	7.3	9.0	9.6	9.9	10.4	10.6	11.1	11.5	10.4	9.2	7.2	6.1	5.6	6.3	6.5	6.0	7.6
Amarillo, Tex.	13.6	13.4	13.1	12.6	12.8	11.6	11.1	11.1	11.9	13.6	14.8	14.9	14.8	15.0	15.4	15.6	16.0	16.6	16.5	15.7	13.8	14.2	13.6	13.6	14.0
Atlanta, Ga.	7.5	7.9	8.0	7.7	7.8	8.1	8.2	7.7	8.4	9.2	10.1	10.4	10.1	9.9	9.6	9.4	8.9	8.8	6.5	7.3	7.7	8.0	7.9	7.6	8.4
Atlantic City, N. J.	10.1	10.1	10.5	10.1	10.0	9.6	10.6	11.9	12.5	12.1	12.0	12.1	12.5	12.7	12.9	12.9	12.4	11.1	10.5	10.2	10.0	10.3	10.7	10.1	11.2
Augusta, Ga.	4.7	4.8	5.0	4.8	5.0	4.6	4.6	5.5	7.0	7.9	8.6	7.8	7.9	7.7	8.5	8.7	8.0	7.1	5.9	4.8	4.9	5.0	5.1	5.0	6.2
Baker City, Oreg.	4.9	5.6	6.4	6.9	7.1	6.8	6.8	6.9	6.8	6.5	5.5	3.8	3.7	4.2	5.0	5.9	6.1	6.4	5.6	5.7	4.3	4.3	4.4	4.8	5.6
Baltimore, Md.	3.5	3.4	3.6	3.5	3.5	3.6	3.9	4.5	5.6	6.1	5.6	5.9	6.6	6.1	6.3	6.2	5.6	5.0	4.0	3.6	3.2	3.4	3.3	3.8	4.6
Bismarck, N. Dak.	7.0	6.9	7.8	6.7	6.4	6.2	6.2	5.8	6.3	8.2	9.9	10.6	12.0	12.9	13.5	14.0	14.0	13.0	12.1	9.7	7.9	7.6	7.9	7.3	9.2
Block Island, R. I.	14.3	13.9	14.1	14.2	14.2	14.2	14.1	14.1	14.7	14.3	14.9	14.3	14.8	14.4	15.0	16.2	16.4	15.3	15.7	15.8	16.0	15.2	14.6	14.0	14.8
Boston, Mass.	9.4	9.2	9.3	9.2	9.1	9.4	9.6	10.2	11.0	11.4	11.0	11.4	11.9	12.6	12.9	12.2	11.4	10.7	9.9	9.9	9.5	10.2	10.4	9.5	10.5
Buffalo, N. Y.	10.3	10.8	11.0	10.4	9.5	9.0	9.4	9.6	9.8	11.4	11.3	11.2	12.4	13.2	13.4	13.2	12.9	12.1	12.1	12.2	12.7	12.9	12.3	11.3	11.4
Cairo, Ill.	4.2	4.0	4.5	4.4	4.5	4.7	4.6	4.5	5.1	5.4	5.8	5.8	6.8	7.5	7.2	7.4	7.3	7.2	5.7	4.6	3.7	3.8	4.0	4.4	5.3
Cape Henry, Va.	14.2	13.6	13.4	12.4	12.2	11.9	11.9	12.7	12.8	13.3	13.7	13.5	13.9	13.9	14.4	14.3	13.9	13.8	13.1	13.3	13.5	13.4	14.3	14.0	13.4
Carson City, Nev.	7.3	6.8	6.7	5.6	5.1	4.3	4.0	3.9	3.6	3.0	3.0	4.0	5.2	6.3	7.6	9.8	10.9	11.6	12.1	12.3	11.0	10.0	9.3	8.5	7.2
Charleston, S. C.	10.4	10.4	11.0	11.6	11.4	11.4	12.0	11.9	12.6	13.2	13.3	14.0	14.4	15.3	14.9	15.1	14.7	14.0	12.6	11.5	11.1	10.9	11.1	10.7	12.5
Charlotte, N. C.	5.7	5.7	5.7	5.2	5.5	5.4	5.3	5.7	6.5	6.8	6.9	6.7	6.5	6.8	6.5	6.5	6.3	5.9	5.4	6.1	6.0	6.0	6.0	5.8	6.0
Chattanooga, Tenn.	3.1	3.0	3.1	3.1	3.0	3.1	3.1	3.3	4.6	5.7	6.1	7.0	7.7	8.1	8.7	8.8	9.3	9.1	7.5	5.8	4.5	3.4	3.0	3.1	5.3
Cheyenne, Wyo.	6.6	6.4	6.5	6.5	6.0	6.5	6.4	6.6	7.0	6.4	8.3	8.9	9.5	9.9	10.2	9.5	10.0	10.1	10.1	9.2	7.7	6.4	5.9	6.3	7.8
Chicago, Ill.	17.3	17.7	18.0	18.0	17.0	15.7	15.4	14.5	14.3	13.8	14.4	14.0	15.4	15.7	16.4	16.2	15.8	16.2	16.1	15.1	14.7	14.9	15.5	16.0	15.7
Cincinnati, Ohio.	2.3	2.5	2.4	2.3	2.5	2.4	3.1	2.9	3.7	5.0	5.6	6.4	7.5	7.0	7.3	7.4	7.6	7.3	5.6	4.5	3.7	3.1	2.7	2.8	4.5
Cleveland, Ohio.	12.6	12.7	13.4	14.0	13.9	13.1	12.1	11.5	10.4	10.1	9.9	11.3	11.6	11.5	11.3	11.5	10.9	10.1	9.3	9.2	10.6	11.9	13.1	12.9	11.6
Columbia, Mo.	6.0	5.6	5.3	5.4	5.2	5.2	5.4	4.8	5.1	6.1	7.0	7.4	7.6	7.5	7.6	7.8	7.8	6.7	5.4	5.2	5.6	6.2	6.5	6.1	6.2
Columbus, Ohio.	3.2	3.1	3.0	3.0	3.2	3.4	2.9	3.4	4.1	4.7	5.3	5.8	6.7	7.0	7.2	7.4	6.9	6.3	5.5	5.1	5.1	4.9	4.1	3.2	4.8
Concordia, Kans.	6.4	6.3	6.0	5.8	5.2	4.8	4.5	4.8	5.5	6.7	7.8	8.6	9.3	9.9	9.9	10.3	9.8	9.2	7.7	5.2	4.7	4.9	5.8	6.0	6.9
Corpus Christi, Tex.	9.2	8.6	8.2	7.5	7.0	7.0	7.0	6.9	7.4	8.4	8.6	8.5	10.1	10.5	11.4	13.0	12.4	12.6	12.7	12.2	11.9	11.7	10.8	9.9	9.7
Davenport, Iowa.	4.3	4.3	4.3	4.1	4.2	4.3	4.5	4.7	5.7	6.4	6.9	7.1	7.8	8.2	8.5	8.0	8.0	7.1	5.1	4.3	4.0	4.8	4.8	4.6	5.7
Denver, Colo.	7.1	7.7	7.0	7.0	7.1	7.1	7.0	6.9	6.5	5.4	4.6	4.7	5.6	6.2	6.6	7.3	8.0	8.4	9.1	8.3	6.5	6.5	6.0	6.1	6.8
Des Moines, Iowa.	5.2	5.0	4.5	4.0	3.8	3.7	4.5	4.6	5.0	7.0	7.9	8.6	9.3	9.8	10.0	10.5	9.6	8.5	7.0	4.9	4.8	4.8	5.2	5.1	6.4
Detroit, Mich.	6.7	6.6	6.4	6.5	6.3	6.1	6.2	6.3	6.4	6.7	7.0	7.4	8.0	8.7	9.4	9.0	9.0	7.0	6.2	6.3	6.7	6.9	6.6	7.0	7.1
Dodge City, Kans.	10.4	9.4	8.3	7.0	7.5	6.8	5.6	6.1	6.8	10.5	13.2	14.5	15.3	15.8	15.7	15.8	15.8	15.3	14.9	12.2	10.8	10.0	10.0	9.8	11.1
Dubuque, Iowa.	4.2	4.1	4.0	4.0	4.2	4.6	4.4	4.5	5.1	6.1	6.6	7.2	8.1	8.5	8.7	8.3	7.8	6.8	5.5	4.9	4.4	4.2	4.4	4.3	5.6
Duluth, Minn.	9.7	9.3	8.6	9.5	9.6	8.6	8.6	8.8	9.0	9.6	11.8	12.2	12.5	12.2	11.5	11.9	11.4	10.7	9.6	8.7	8.9	9.1	9.2	9.7	10.0
Eastport, Me.	7.9	8.8	7.9	8.4	8.9	9.1	8.9	10.3	10.7	11.3	11.5	12.0	12.1	12.3	12.0	11.7	11.0	9.6	8.6	8.1	8.0	7.7	8.0	8.0	9.7
El Paso, Tex.	6.9	6.8	7.4	7.7	7.6	8.0	7.6	7.9	7.6	7.8	8.6	9.3	8.7	7.7	8.2	8.3	8.9	8.4	8.4	8.0	7.8	7.8	7.8	7.3	7.9
Erie, Pa.	8.5	8.7	9.6	9.5	9.9	9.4	8.8	8.5	8.4	8.4	9.1	9.3	10.1	9.0	9.0	8.8	8.1	7.2	7.6	8.0	7.6	7.7	8.0	8.1	8.6
Eureka, Cal.	4.4	3.8	3.0	3.1	2.9	2.9	2.5	2.2	2.7	2.8	2.8	3.6	5.4	6.9	8.0	9.3	10.1	9.6	9.2	8.2	7.2	4.9	4.3	4.1	5.2
Fort Canby, Wash.	9.6	10.1	9.7	10.2	9.9	10.2	10.6	9.8	9.9	10.2	11.0	10.7	11.1	12.2	13.1	12.7	13.0	13.0	12.6	13.2	12.6	11.7	11.5	11.2	11.2
Fort Smith, Ark.	4.1	4.1	3.5	3.7	3.8	4.2	4.0	4.6	5.1	5.4	5.6	5.5	5.9	6.2	6.5	6.6	6.1	5.7	4.6	3.9	3.6	3.3	3.7	4.4	4.8
Fresno, Cal.	8.0	7.8	7.3	7.0	6.4	5.8	5.4	5.3	5.0	4.6	4.9	4.5	5.4	5.0	5.0	5.2	5.5	5.5	6.4	6.9	6.4	6.0	6.6	7.5	6.0
Galveston, Tex.	9.4	9.8	10.0	9.5	9.7	9.4	9.6	11.2	11.5	12.0	12.0	12.0	12.0	11.8	11.8	11.4	10.8	9.8	8.8	8.9	8.4	8.9	9.1	9.8	10.3
Grand Haven, Mich.	6.0	6.0	6.2	6.1	6.1	5.7	5.6	5.7	7.0	8.2	9.4	9.8	9.7	9.7	9.9	9.7	8.6	7.2	5.8	5.4	5.0	5.5	6.5	6.1	7.1
Greenbay, Wis.	4.8	5.6	5.7	5.1	4.6	4.4	5.0	5.5	6.9	8.1	8.5	8.4	8.3	8.9	9.0	9.1	9.0	8.5	6.9	6.2	6.0	5.8	5.7	5.4	6.7
Hannibal, Mo.	6.2	6.4	5.7	5.4	5.0	5.0	5.0	4.8	5.6	7.4	8.2	8.8	9.3	9.5	9.3	9.3	9.3	8.9	7.4	6.6	5.9	5.3	5.8	5.8	6.9
Harrisburg, Pa.	5.0	4.8	4.5	4.3	4.1	3.9	4.2	5.1	5.6	6.7	6.9	7.1	7.6	7.8	7.7	8.0	7.0	6.0	5.3	5.1	5.0	5.5	4.9	4.4	5.7
Hatteras, N. C.	10.3	9.6	10.0	9.9	10.2	9.9	10.6	10.8	11.4	11.1	11.5	10.8	12.0	12.9	13.1	12.5	12.5	11.8	11.6	10.8	10.5	10.1	10.4	10.3	11.0
Havre, Mont.	5.7	5.7	5.9	6.7	7.4	7.1	6.9	6.9	7.1	7.9	10.2	11.3	13.0	12.6	12.6	12.4	12.0	11.9	11.0	9.8	7.5	7.0	6.0	5.2	8.7
Helena, Mont.	8.3	7.3	6.5	6.5	5.8	6.4	5.7	5.1	4.6	4.1	4.3	4.5	4.9	4.4	5.2	6.1	7.0	6.8	7.4	6.3	7.0	8.4	8.0	8.0	6.2
Huron, S. Dak.	10.7	10.0	9.9	9.5	9.4	9.5	9.4	9.7	11.3	13.2	14.3	14.9	15.5	16.1	16.4	16.6	16.5	15.9	13.5	11.5	11.0	11.9	11.3	11.1	12.5
Idaho Falls, Idaho.	8.0	8.1	8.3	7.8	7.8	8.4	8.8	8.0	7.8	8.4	9.3	10.6	11.4	12.6	12.9	12.7	12.6	14.1	14.1	12.0	9.6	8.7	8.4	7.6	9.9
Indianapolis, Ind.	5.7	5.4	5.6	5.5	5.1	5.0	4.4	4.3	5.6	5.9	6.7	7.6	8.3	8.2	8.6	8.8	7.9	7.9	6.9	6.2	6.1	6.9	6.2	6.1	6.5
Jacksonville, Fla.	6.0	6.1	5.9	5.6	5.9	6.8	7.1	7.5	8.4	9.8	10.8	11.3	11.6	11.8	11.4	11.3	10.5	9.2	7.8	7.1	6.6	6.5	6.3	6.3	8.2
Jupiter, Fla.	8.4	8.2	8.0	8.1	7.8	7.0	7.0	7.0	7.2	8.7	9.5	10.4	10.7	10.8	11.1	10.3	9.4	9.3	9.5	9.6	9.4	9.9	9.6	9.0	9.0
Kansas City, Mo.	6.5	6.0	6.0	6.2	5.9	5.6	5.6	5.5	6.2	6.7	7.1	7.2	7.9	7.9	8.2	7.9	7.8	7.0	6.1	5.4	5.4	5.4	5.6	5.7	6.4
Keokuk, Iowa.	5.1	4.8	5.0	4.7	4.0	4.3	5.0	5.6	5.8	6.4	6.8	7.3	7.5	7.7	8.2	8.1	8.0	7.3	5.5	4.6	5.0	5.0	4.8	5.3	5.9
Key West, Fla.	8.3	8.5	8.7	8.4	8.8	8.1	7.5	8.1	8.6	9.4	9.5	9.0	8.9	8.2	8.0	8.3	7.9	8.2	7.7	8.3	8.8	8.6	8.6	8.8	8.5
Kittyhawk, N. C.	14.2	14.1	14.1	14.2	13.8	13.8	13.7	14.6	15.5	15.2	15.2	15.3	16.0	15.9	16.0	16.0	16.3	15.6	16.1	15.7	15.0	14.6	14.2	14.1	15.0
Knoxville, Tenn.	3.5	4.1	4.0	3.8	4.2	4.1	3.7	3.8	5.0	5.7	5.8	5.9	6.5	7.1	7.5	7.8	8.2	7.7	6.7	5.8	5.1	4.7	4.1	4.1	5.4
La Crosse, Wis.	5.2	5.6	5.3	5.5	5.5	5.1	5.2	5.6	6.6	7.1	7.9	7.3	7.2	7.7	7.8	8.2	7.9	7.2	6.2	5.9	5.7	5.7	5.5	5.8	6.4
Lander, Wyo.	4.4	4.2	3.6	3.7	3.4	3.1	2.7	2.6	2.6	2.7	3.5	4.8	6.1	6.7	6.8	7.7	7.9	8.9	8.0	7.1	7.2	6.5	5.9	5.1	5.2
Lexington, Ky.	6.5	6.3	6.3	6.3	6.6	5.9	6.0	6.0	6.3	6.7	7.1	7.4	7.5	8.3	7.9	7.9	7.8	7.5	6.2	7.0	7.0	6.9	7.0	6.9	6.9
Little Rock, Ark.	3.5	3.3	3.6	3.6	3.4	3.7	3.7	3.8	5.2	6.2	6.7	7.1	7.4	7.7	8.3	9.1	9.5	8.8	7.7	5.8	4.5	3.4	3.4	3.2	5.5
Los Angeles, Cal.	2.0	2.1	2.5	2.2	2.1	2.0	2.0	2.3	2.1	2.5	2.8	3.2	3.9	4.7	5.7	7.5	8.7	9.1	8.8	7.8	6.5	5.0	3.7	2.2	4.2
Louisville, Ky.	4.7	4.7	4.6	4.8	4.9	4.4	4.7	4.4	5.0	5.3	6.6	7.5	8.5	8.7	8.6	8.4	8.3	7.6	6.6	6.2	6.0	5.9	5.5	4.5	6.1
Lynchburg, Va.	2.0	1.6	1.6	1.5	1.8	1.4	2.0	2.6	3.9	4.6	4.6	5.1	5.3	5.3	5.1	5.1	5.4	5.1	4.0	2.5	1.9	1.8	1.9	1.7	3.2
Marquette, Mich.	9.5	9.6	9.5	10.0	10.4	10.4	10.4	11.2	11.1	11.4	11.3	11.5	12.1	12.0	12.5	12.1	10.6	9.9	7.6	7.7	8.8	10.0	10.8	10.4	10.5
Memphis, Tenn.	8.1	8.5	8.0	7.7	7.3	7.2	6.7	6.8	6.8	7.6	7.6	7.2	8.4	8.5	9.4	10.1	10.1	9.5	8.3	7.3	7.8	8.1	7.9	8.0	8.0
Milwaukee, Wis.	7.5	7.5	7.0	6.4	6.7	6.8	6.6	6.8	7.9	9.0	9.7	10.2	11.3	12.0	12.1	11.7	10.8	9.5	7.9	6.9	7.1	7.2	7.0	6.9	8.4
Mobile, Ala.	5.6	5.6	5.0	5.3	5.7	5.8	5.9	5.8	6.8	7.1	7.5	7.8	8.2	8.9	9.0	9.5	9.5	8.5	7.5	7.0	6.8	6.3	6.4	5.6	7.0
Montgomery, Ala.	4.8	4.6	4.7	4.5	4.3	4.1	4.1	5.3	6.6	7.5	8.4	8.6	9.0	9.0	8.4	8.5	8.2	6.8	6.1	5.6	4.8	5.1	4.5	5.1	6.2
Moorhead, Minn.	10.6	9.8	9.6	9.0	8.8	8.2	8.1	8.6	9.6	10.9	12.2	11.9	12.5	13.7	14.4	14.0	14.0	13.6	12.3	11.5	11.2	10.9	11.0	10.9	11.1
Nantucket, Mass.	10.3	11.2	10.8	10.7	11.5	10.7	11.0	11.5	11.6	12.1	11.9	11.8	12.0	11.3	10.8	11.0	11.0	10.0	9.5	9.7	9.9	10.5	10.9	10.8	10.9
Nashville, Tenn.	3.0	2.5	2.5	2.5	2.1	2.4	2.6	3.0	3.4	4.4	6.0	7.0	8.0	8.0	8.4	8.3	7.9	8.3	7.4	5.8	5.3	4.8	4.2	3.2	5.0
New Haven, Conn.	6.8	6.7	7.0	6.5	7.1	7.0	7.4	7.7	8.3	9.4	9.7	9.9	10.7	11.1	11.6	11.3	10.2	8.3	8.4	7.7	7.4	6.9	7.3	6.7	8.4
New Orleans, La.	7.8	7.7	7.5	8.3	9.0	8.7	9.2	9.8	10.9	12.2	12.7	13.6	13.6	13.6	13.1	13.5	12.2	9.9	8.8	8.0	7.8	7.6	7.5	8.0	10.0
New York, N. Y.	12.1	11.9	11.8	11.7	10.7	10.5	10.1	10.2	10.9	11.5	12.2	12.2	12.6	13.0	14.2	14.7	15.4	14.3	14.2	14.2	13.7	12.6	12.4	12.5	12.5
Norfolk, Va.	6.1	5.9	5.8	5.9	5.8	5.0	5.6	6.6	7.6	7.7	8.3	8.5	9.0	9.6	9.5	9.2	9.1	8.3	7.4	7.0	7.3	6.5	6.7	6.5	7.3
Northfield, Vt.	6.7	5.8	5.2	5.2	4.9	4.8	5.2	5.4	6.5	7.3	9.4	10.2	11.1	10.6	10.4	9.7	9.2	8.0	7.4	7.2	7.0	6.8	6.6	6.9	7.4
North Platte, Nebr.	10.4	9.9	9.1	9.1	7.8	6.7	6.9	6.1	6.2	8.3	8.8	10.2	11.8	13.0	14.0	14.1	13.2	12.4	11.9	9.8	8.6	9.2	9.6	10.4	9.9
Oklahoma, Okla.	6.1	5.7	6.1	5.9	5.8	5.6	5.7	6.1	6.8	8.1	9.8	10.3	10.3	10.6	11.4	11.0	11.8	11.4	10.0	8.1	7.0	6.7	6.6	5.9	8.0
Omaha, Nebr.	6.1	6.3	5.7	5.6	5.5	5.2	4.9	4.9	5.9	7.2	7.3	8.1	8.8	10.0	10.7	11.3	10.8	10.0	8.0	6.5	6.1	6.2	6.3	6.0	7.2
Oswego, N. Y.	8.7	8.7	8.5	8.0	8.1	8.3	8.8	8.7	9.0	9.8	10.2	9.7	9.8	9.8	9.3	8.8	8.6	7.0	7.6	7.4	7.6	8.5	8.8	8.5	8.7
Palestine, Tex.	4.5	4.5	4.1	4.0	3.8	3.9	3.9	3.9	4.5	6.0	7.1	7.5	8.2	9.0	9.5	9.4	9.2	8.2	7.1	5.3	4.3	4.5	4.6	4.4	5.9
Parkersburg, W. Va.	2.6	2.5	2.5	2.5	2.3	2.5	2.8	2.5	3.5	4.4	4.7	5.5	5.8	5.7	6.1	5.8	5.2	4.6	3.9	3.5	3.5	3.4	2.7	2.8	3.8

TABLE VII.—*Average wind movement, etc.*—Continued.

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Pensacola, Fla.	9.8	10.1	9.8	10.0	10.5	10.0	10.2	10.6	10.5	10.9	11.5	11.4	11.9	12.2	12.1	11.8	11.9	12.2	11.1	9.9	9.9	10.2	9.9	9.7	10.3
Philadelphia, Pa.	8.0	8.2	8.3	8.4	8.1	8.0	8.9	9.7	10.2	10.3	10.7	10.4	10.7	10.8	11.9	11.4	11.3	10.0	9.1	9.0	9.4	8.9	8.7	8.5	9.5
Phœnix, Ariz	3.6	4.0	3.9	3.8	3.4	3.4	2.9	3.0	2.9	3.1	4.1	5.3	5.0	5.2	4.9	4.9	4.9	4.3	3.8	3.5	4.0	3.6	3.0	3.2	3.9
Pierre, S. Dak.	9.1	8.7	8.3	6.7	6.9	6.2	6.6	6.7	5.9	7.5	9.1	10.3	10.9	10.8	10.9	11.4	11.9	12.2	12.0	9.7	8.3	8.7	7.7	8.1	8.9
Pittsburg, Pa.	2.3	2.5	2.5	2.7	2.8	2.8	2.6	2.7	3.3	3.4	4.5	5.0	5.7	6.0	6.3	6.2	5.9	4.9	4.1	2.9	2.6	2.8	2.8	2.6	3.7
Port Angeles, Wash.	4.3	4.6	4.6	4.7	4.4	4.7	4.3	4.4	4.2	3.9	3.0	2.9	3.5	4.5	5.2	5.6	5.7	5.8	6.0	6.1	5.2	4.1	4.2	4.2	4.6
Port Huron, Mich.	8.0	7.7	8.0	7.7	8.0	8.1	8.0	7.5	7.1	7.8	8.7	9.0	10.0	10.8	11.8	11.4	11.5	10.7	9.7	9.0	8.7	8.8	8.5	8.3	9.0
Portland, Me.	4.9	5.5	5.5	5.3	5.3	5.5	5.4	6.5	7.3	7.1	7.9	8.2	8.8	9.7	9.5	8.7	7.7	6.7	6.2	5.5	5.2	6.0	5.6	5.6	6.6
Portland, Oreg.	6.9	6.6	5.7	5.4	6.2	5.5	5.0	5.6	6.0	5.5	5.9	6.5	6.1	6.6	6.8	7.6	8.3	8.9	9.1	9.7	8.3	7.5	7.1	6.8	6.8
Pueblo, Colo.	6.2	4.8	4.9	4.5	4.8	4.5	4.0	4.0	3.7	3.8	4.4	4.8	5.3	6.3	8.0	8.6	9.2	9.5	9.3	8.2	7.8	6.5	6.6	6.9	6.1
Raleigh, N. C.	5.3	5.1	4.6	5.3	5.5	5.1	4.7	6.0	7.0	7.9	7.5	7.4	7.8	7.5	7.7	7.3	7.2	6.5	5.4	5.3	5.1	5.2	5.1	5.1	6.1
Rapid City, S. Dak.	7.5	7.6	6.6	7.0	6.4	6.7	6.3	5.6	6.1	6.2	6.3	6.5	7.8	9.8	10.3	11.0	11.1	10.9	10.0	8.0	6.0	6.5	6.7	6.6	7.6
Redbluff, Cal.	5.1	5.6	5.0	5.7	5.6	5.6	5.3	5.1	5.2	5.3	5.6	5.9	5.9	5.4	5.3	5.7	6.1	6.1	6.4	6.8	6.2	5.5	5.1	4.9	5.6
Rochester, N. Y.	5.2	5.3	5.2	5.3	5.3	5.7	5.9	6.2	6.9	7.2	7.9	8.3	8.6	8.6	8.8	8.7	8.3	6.5	5.8	5.1	5.5	5.3	5.1	5.3	6.5
Roseburg, Oreg.	2.4	1.9	2.0	1.8	1.7	1.6	1.8	1.9	1.7	2.0	2.0	2.5	2.9	3.6	3.7	4.8	5.2	5.6	6.6	7.0	6.4	4.4	3.3	2.7	3.3
Sacramento, Cal.	8.2	7.8	8.0	8.5	7.7	7.7	7.6	7.1	6.6	6.2	6.2	5.8	6.1	6.2	6.9	7.1	7.3	7.8	7.8	7.8	7.4	8.2	8.8	8.9	7.4
St. Louis, Mo.	8.0	7.7	7.1	6.4	6.2	6.2	5.5	5.5	6.0	6.1	6.9	7.4	7.8	8.0	8.3	8.3	8.3	8.1	7.6	7.4	7.6	8.0	8.4	8.1	7.3
St. Paul, Minn.	5.1	5.1	5.3	5.6	5.8	5.6	5.4	5.7	6.1	6.9	7.3	7.8	8.6	9.1	9.2	9.8	9.3	8.7	7.4	6.6	6.6	6.0	5.1	5.1	6.8
Salt Lake City, Utah.	4.8	4.3	4.2	4.1	4.5	4.8	5.3	4.5	4.2	3.7	4.0	5.3	9.0	10.4	11.6	11.4	11.5	11.4	9.3	7.3	6.0	4.6	4.2	4.1	6.4
San Antonio, Tex.	6.2	5.8	5.4	5.7	6.0	6.0	6.1	6.1	6.5	6.7	7.3	7.5	8.1	8.5	9.4	9.0	9.5	9.6	9.1	8.0	8.2	8.0	7.0	6.6	7.3
San Diego, Cal.	3.1	3.1	3.4	3.2	3.5	3.8	3.5	3.5	3.5	3.5	3.9	4.8	6.5	9.0	10.5	11.1	11.0	10.5	9.2	8.3	7.1	5.4	3.7	3.4	5.8
Sandusky, Ohio	8.0	7.4	7.5	7.1	7.3	6.4	6.4	6.3	6.8	6.6	6.8	7.3	7.8	8.0	8.6	8.4	8.0	7.4	6.9	6.7	6.5	6.7	6.9	7.3	7.2
San Francisco, Cal.	9.9	9.2	8.4	8.2	7.8	7.4	7.7	7.4	6.8	7.5	7.3	7.8	8.1	9.2	12.0	15.3	17.8	20.2	20.9	20.2	19.4	18.1	14.6	11.0	11.8
San Luis Obispo, Cal.	2.3	2.1	1.8	2.4	2.7	2.9	2.9	3.4	3.3	3.4	4.0	4.4	4.7	5.5	6.3	7.5	8.4	7.8	7.3	6.6	5.5	4.7	3.6	2.6	4.4
Santa Fe, N. Mex.	4.4	4.5	4.4	3.8	4.0	3.1	2.6	2.2	1.7	2.2	3.4	4.7	6.1	6.8	6.9	7.6	7.6	6.8	6.4	6.2	4.9	5.2	6.2	5.5	4.9
Sault Ste Marie, Mich.	5.0	5.1	5.1	4.9	5.2	5.6	5.5	5.8	7.2	8.2	8.4	8.3	9.6	10.0	10.6	11.1	10.9	9.4	7.9	6.8	6.1	5.5	5.4	5.2	7.2
Savannah, Ga.	7.1	7.2	7.7	7.7	7.7	7.7	7.7	8.2	9.1	10.2	10.6	10.3	11.6	12.3	13.0	12.7	11.9	10.3	9.0	8.0	8.2	8.1	7.6	7.4	9.2
Seattle, Wash.	2.9	2.6	2.8	2.4	2.7	2.6	2.7	3.1	3.1	3.3	3.2	3.8	4.2	4.5	4.4	4.7	4.6	4.9	5.2	5.1	4.7	4.2	3.8	3.2	3.7
Shreveport, La.	4.9	4.6	4.4	4.8	4.0	3.8	4.3	4.6	5.3	6.3	6.8	7.0	8.3	8.7	9.0	9.6	8.8	8.5	6.5	4.9	5.0	5.3	5.4	5.3	6.1
Sioux City, Iowa.	11.6	11.2	11.2	10.0	10.1	9.7	9.2	9.1	8.8	10.2	11.9	13.3	14.5	15.6	16.5	16.5	15.9	15.2	13.4	13.1	12.4	12.7	11.8	11.3	12.3
Spokane, Wash.	4.5	4.3	3.6	3.7	3.6	3.1	3.2	3.1	3.2	3.0	4.0	5.2	5.8	5.8	5.7	6.0	5.7	5.3	5.6	5.8	5.0	4.0	4.1	3.4	4.4
Springfield, Ill.	7.2	6.9	7.1	6.9	6.6	6.6	6.9	6.9	7.4	7.2	7.6	8.0	8.2	8.1	8.3	8.9	8.1	7.1	5.5	5.7	6.3	7.3	7.2	7.0	7.2
Springfield, Mo.	8.1	8.4	8.0	8.1	7.8	7.7	7.7	7.6	7.5	8.8	9.7	9.7	9.5	9.0	9.2	9.6	9.6	9.4	8.9	7.8	7.7	8.0	8.5	8.4	8.5
Tacoma, Wash.	4.0	3.6	3.5	3.2	2.7	3.0	2.9	2.8	2.9	3.0	3.4	3.8	4.5	5.5	5.5	6.1	5.8	6.1	6.0	5.7	5.0	4.5	4.0	3.5	4.2
Tampa, Fla.	5.9	6.0	5.9	5.5	5.6	5.3	5.7	6.7	7.6	8.6	8.9	9.1	9.7	9.5	9.5	9.2	9.0	7.8	7.7	7.3	6.8	6.1	6.0	5.6	7.3
Tatoosh Island, Wash.	8.4	9.5	9.6	8.9	9.5	10.4	10.1	10.6	10.6	10.4	11.2	12.1	11.2	10.8	10.3	10.1	9.6	9.5	8.6	7.4	7.2	7.4	6.6	8.1	9.5
Toledo, Ohio	7.3	6.5	6.4	6.8	6.5	5.9	6.1	6.0	6.9	7.4	7.7	7.6	8.3	8.9	9.1	8.5	9.1	8.0	6.6	5.9	5.9	6.5	6.7	6.6	7.1
Vicksburg, Miss.	5.2	5.6	5.0	4.9	5.2	5.3	5.3	5.1	5.5	6.7	6.9	7.2	8.2	8.4	8.3	8.2	8.1	6.8	4.9	4.2	4.7	5.4	5.5	5.3	6.1
Vineyard Haven, Mass.	6.9	7.2	7.5	7.3	7.2	7.2	7.8	9.2	9.6	9.6	9.5	9.4	9.8	9.6	9.4	9.7	9.1	8.7	8.0	8.4	8.6	7.9	7.2	7.3	8.4
Walla Walla, Wash.	4.5	4.5	4.7	4.5	4.2	4.3	4.0	3.9	4.0	3.9	3.7	4.3	4.5	5.1	5.3	5.3	4.9	4.9	4.7	4.1	4.3	4.4	4.5	4.7	4.5
Washington, D. C.	3.7	4.3	4.2	4.0	4.1	3.9	4.0	4.9	5.9	6.8	7.0	7.6	7.9	8.0	8.2	7.6	7.2	6.0	4.6	4.1	3.8	4.1	4.0	3.9	5.4
Wichita, Kans.	5.7	5.3	5.5	4.7	4.9	5.1	4.9	4.6	5.6	6.6	7.8	8.7	9.3	9.3	9.8	9.6	9.6	9.0	7.8	6.6	5.6	5.5	5.8	5.9	6.8
Williston, N. Dak.	7.3	6.9	6.0	5.4	4.8	4.8	5.4	5.1	4.4	6.1	7.8	8.7	11.2	12.0	12.6	12.9	13.1	12.5	12.0	9.6	8.4	7.8	8.0	7.6	8.4
Wilmington, N. C.	5.3	5.7	5.7	5.9	6.4	6.3	6.6	7.1	7.8	8.5	8.6	8.9	9.2	9.5	9.7	9.5	9.6	8.3	7.2	7.0	6.2	5.8	5.6	5.0	7.3
Woods Hole, Mass.	13.6	13.7	13.4	13.2	12.3	12.2	12.6	13.4	13.4	12.8	12.7	12.5	13.7	13.5	13.5	14.8	15.1	14.7	13.9	13.8	14.5	14.8	13.3	13.5	13.5
Yankton, S. Dak.	9.3	8.8	8.3	8.3	7.3	5.9	5.4	5.6	7.3	9.2	10.4	11.0	11.6	12.9	13.9	14.6	14.3	13.5	10.3	7.9	7.4	8.1	8.3	8.9	9.5

TABLE VIII.—*Resultant winds from observations at 8 a. m. and 8 p. m., daily, during the month of September, 1897.*

Stations.	Component direction from—				Resultant.	
	N.	S.	E.	W.	Direction from—	Duration.
New England.	*Hours.*	*Hours.*	*Hours.*	*Hours.*	°	*Hours.*
Eastport, Me	22	12	10	27	n. 60 w.	20
Portland, Me	19	16	5	34	n. 84 w.	29
Northfield, Vt	21	32	1	14	s. 55 w.	16
Boston, Mass	24	11	9	32	n. 61 w.	26
Nantucket, Mass	20	19	15	25	n. 84 w.	10
Woods Hole, Mass.*	6	14	5	12	s. 41 w.	11
Block Island, R. I	19	15	14	30	n. 76 w.	16
New Haven, Conn	30	12	7	24	n. 43 w.	25
Middle Atlantic States.						
Albany, N. Y	23	23	5	16	w.	11
Binghamton, N. Y†	16	3	13	7	n. 25 e.	14
New York, N. Y	22	20	8	25	n. 83 w.	17
Harrisburg, Pa	23	9	17	24	n. 27 w.	16
Philadelphia, Pa	23	15	13	24	n. 54 w.	14
Atlantic City, N. J	19	15	13	25	n. 72 w.	13
Baltimore, Md	20	16	16	20	n. 45 w.	6
Washington, D. C	27	18	14	13	n. 6 e.	9
Lynchburg, Va	22	15	21	16	n. 36 e.	9
Norfolk, Va	22	14	31	12	n. 67 e.	21
South Atlantic States.						
Charlotte, N. C	17	26	26	5	s. 67 e.	23
Hatteras, N. C	26	12	22	14	n. 50 e.	16
Kittyhawk, N. C	23	12	25	18	n. 32 e.	13
Raleigh, N. C	22	17	17	13	n. 39 e.	6
Wilmington, N. C	25	16	22	13	n. 45 e.	13
Charleston, S. C	25	9	31	8	n. 55 e.	28
Augusta, Ga	23	18	28	7	n. 77 e.	22
Savannah, Ga	24	13	28	9	n. 60 e.	22
Jacksonville, Fla	31	9	33	6	n. 51 e.	35
Florida Peninsula.						
Jupiter, Fla	11	22	28	6	s. 45 e.	31
Key West, Fla	18	18	34	5	e.	29
Tampa, Fla	34	4	28	10	n. 31 e.	35
Eastern Gulf States.						
Atlanta, Ga	23	10	32	11	n. 31 e.	25
Pensacola, Fla	29	14	29	8	n. 36 e.	19
Mobile, Ala	24	14	25	11	n. 54 e.	17
Montgomery, Ala	16	13	34	7	n. 84 e.	27
Vicksburg, Miss	19	11	29	4	n. 72 e.	26
New Orleans, La	29	7	34	6	n. 52 e.	36
Western Gulf States.						
Shreveport, La	18	21	24	10	s. 78 e.	14
Fort Smith, Ark	18	13	35	8	n. 80 e.	28
Little Rock, Ark	21	16	24	16	n. 58 e.	9
Corpus Christi, Tex	23	9	30	8	n. 58 e.	26
Galveston, Tex	26	12	27	5	n. 58 e.	26
Palestine, Tex	36	11	25	4	n. 40 e.	33
San Antonio, Tex	30	15	24	1	n. 57 e.	28
Ohio Valley and Tennessee.						
Chattanooga, Tenn	26	11	22	15	n. 25 e.	17
Knoxville, Tenn	32	7	18	17	n 2 e.	25
Memphis, Tenn	27	13	19	12	n. 27 e.	16
Nashville, Tenn	19	14	22	16	n. 50 e.	8
Lexington, Ky	15	20	30	9	s. 77 e.	22
Louisville, Ky	29	17	16	6	n. 40 e.	16
Indianapolis, Ind	20	20	19	14	e.	5
Cincinnati, Ohio	16	20	28	7	s. 79 e.	21
Columbus, Ohio	20	24	18	9	s. 66 e.	10
Pittsburg, Pa	31	7	15	17	n. 5 w.	24
Parkersburg, W. Va	27	19	17	7	n. 51 e.	13
Lower Lake Region.						
Buffalo, N. Y	14	22	14	23	s. 48 w.	12
Oswego, N. Y	14	27	13	18	s. 21 w.	14
Rochester, N. Y	15	22	11	31	s. 71 w.	21
Erie, Pa	12	29	16	12	s. 13 e.	18
Cleveland, Ohio	14	29	26	6	s. 53 e.	25
Sandusky, Ohio	10	24	27	11	s. 49 e.	21
Toledo, Ohio	16	17	23	20	s. 72 e.	3
Detroit, Mich	19	22	17	16	s. 18 e.	3
Upper Lake Region.						
Alpena, Mich	22	17	15	20	n. 45 w.	7
Grand Haven, Mich	19	30	23	9	s. 86 e.	14
Marquette, Mich	23	24	10	19	s. 84 w.	9
Port Huron, Mich	19	31	9	11	s. 9 w.	12
Sault Ste. Marie, Mich	15	16	26	16	s. 84 e.	10
Chicago, Ill	11	22	18	19	s. 5 w.	11
Milwaukee, Wis	14	26	19	13	s. 30 e.	14
Greenbay, Wis	13	28	14	12	s. 8 e.	15
Duluth, Minn	32	9	18	20	n. 5 w.	23
North Dakota.						
Moorhead, Minn	18	24	29	11	s. 72 e.	19
Bismarck, N. Dak	15	16	26	17	s. 84 e.	9
Williston, N. Dak	20	20	19	15	e.	4
Upper Mississippi Valley.						
St. Paul, Minn	13	32	24	11	s. 34 e.	23
La Crosse, Wis. †	9	16	8	6	s. 16 e.	7
Davenport, Iowa	12	24	21	15	s. 27 e.	13
Des Moines, Iowa	12	32	11	19	s. 22 w.	22
Dubuque, Iowa	13	29	14	13	s. 3 e.	16
Keokuk, Iowa	15	29	15	12	s. 12 e.	14
Cairo, Ill	22	22	15	10	e.	5
Springfield, Ill	9	27	24	11	s. 36 e.	22
Hannibal Mo.†	5	14	6	11	s. 29 w.	10
St. Louis, Mo	16	28	21	7	s. 49 e.	18
Missouri Valley.						
Columbia, Mo.*	9	8	13	6	n. 82 e.	7
Kansas City, Mo	13	36	9	12	s. 7 w.	23
Springfield, Mo	7	33	29	7	s. 40 e.	34
Lincoln, Nebr	9	42	19	4	s. 24 e.	36
Omaha, Nebr	11	36	16	10	s. 13 e.	26
Sioux City, Iowa†	7	15	12	3	s. 48 e.	12
Pierre, S. Dak	13	23	27	9	s. 61 e.	21
Huron, S. Dak	12	26	28	5	s. 64 e.	26
Yankton, S. Dak	12	31	12	10	s. 6 e.	19
Northern Slope.						
Havre, Mont	14	10	7	40	n. 83 w.	33
Miles City, Mont	12	22	15	19	s. 22 w.	11
Helena, Mont	12	27	2	35	s. 11 w.	15
Rapid City, S. Dak	17	19	17	25	s. 76 w.	8
Cheyenne, Wyo	22	23	8	22	s. 86 w.	14
Lander, Wyo	16	33	12	16	s. 13 w.	18
North Platte, Nebr	8	34	12	15	s. 7 w.	26
Middle Slope.						
Denver, Colo	17	30	10	12	s. 9 w.	13
Pueblo, Colo	23	12	17	21	n. 20 w.	12
Concordia, Kans	6	41	11	9	s. 3 e.	35
Dodge City, Kans	8	42	10	5	s. 8 w.	34
Wichita, Kans	6	43	21	2	s. 27 e.	42
Oklahoma, Okla	9	40	20	3	s. 29 e.	35
Southern Slope.						
Abilene, Tex	10	34	24	9	s. 32 e.	28
Amarillo, Tex	3	51	3	8	s. 6 w.	48
Southern Plateau.						
El Paso, Tex	12	12	43	5	e.	38
Santa Fe, N. Mex	13	23	28	8	s. 63 e.	22
Phœnix, Ariz	18	6	30	17	n. 47 e.	18
Yuma, Ariz	17	16	15	25	n. 84 w.	10
Middle Plateau.						
Carson City, Nev	18	15	4	35	s. 84 w.	31
Winnemucca, Nev	20	12	11	30	n. 67 w.	21
Salt Lake City, Utah	12	20	25	16	s. 48 e.	12
Northern Plateau.						
Baker City, Oreg	24	26	8	15	s. 74 w.	7
Idaho Falls, Idaho	18	36	2	10	s. 24 w.	20
Spokane, Wash	19	22	20	6	s. 78 e.	14
Walla Walla, Wash	19	21	18	11	s. 74 e.	7
North Pacific Coast Region.						
Fort Canby, Wash	29	18	12	10	n. 10 e.	11
Port Angeles, Wash.*	10	1	10	15	n. 29 w.	10
Seattle, Wash	16	21	8	21	s. 69 w.	14
Tacoma, Wash	31	14	8	17	n. 18 w.	28
Tatoosh Island, Wash	8	17	17	20	s. 18 w.	10
Portland, Oreg	25	17	11	30	n. 67 w.	21
Roseburg, Oreg	23	6	22	13	n. 28 e.	19
Middle Pacific Coast Region.						
Eureka, Cal	19	18	10	32	n. 87 w.	22
Redbluff, Cal	27	19	17	10	n. 41 e.	11
Sacramento, Cal	10	36	11	19	s. 17 w.	27
San Francisco, Cal	3	6	1	53	s. 88 w.	52
South Pacific Coast Region.						
Fresno, Cal	36	2	2	42	n. 50 w.	52
Los Angeles, Cal	15	7	14	35	n. 69 w.	22
San Diego, Cal	26	11	8	29	n. 55 w.	26
San Luis Obispo, Cal	20	21	6	22	s. 87 w.	16

*From observations at 8 p. m. only. †From observations at 8 a. m. only.

TABLE IX.—*Thunderstorms and auroras, September, 1897.*

States.	No. of stations.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total. No.	Total. Days.	
Alabama	52	T.	....	1	1	....	....	....	....	....	....	....	....	2	3	....	....	....	4	2	....	....	....	....	....	....	....	1	....	....	....	....	....	14	7	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Arizona	52	T.	7	3	....	2	3	4	3	4	2	2	6	2	3	....	1	2	1	....	6	3	3	4	5	4	4	1	3	7	2	1	....	88	27	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Arkansas	61	T.	....	....	....	....	....	....	....	2	1	1	....	1	2	....	1	6	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	15	8	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
California	181	T.	....	1	....	....	....	....	....	....	....	1	1	3	....	....	....	....	1	2	....	2	3	2	4	4	8	....	....	....	....	1	....	33	13	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Colorado	75	T.	3	1	....	2	4	1	1	9	5	3	7	5	15	5	13	4	2	1	....	....	....	....	2	3	3	1	2	3	6	7	....	108	25	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Connecticut	14	T.	....	6	....	....	....	....	....	1	....	....	6	....	1	....	....	....	2	....	....	1	....	....	....	....	....	9	....	....	....	....	....	26	7	T.
		A.	....	....	....	....	....	....	....	..	..	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1	1	A.
Delaware	3	T.	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1	1	A.
Dist. of Columbia	4	T.	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Florida	45	T.	1	3	4	5	14	9	6	11	6	7	7	2	1	3	5	5	2	5	4	9	2	....	....	1	....	..	1	3	4	1	....	121	26	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Georgia	62	T.	2	2	....	....	....	....	....	....	....	1	....	....	....	....	....	1	4	3	1	....	1	....	....	....	1	....	....	....	1	....	....	17	10	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Idaho	30	T.	....	....	1	....	1	....	....	8	....	10	....	2	2	....	....	....	....	....	....	....	1	2	2	1	....	....	2	....	3	2	....	37	13	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1	1	A.
Illinois	92	T.	22	12	....	1	....	....	....	....	....	1	3	....	....	....	2	28	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	70	8	T.
		A.	....	....	....	....	....	....	1	1	1	....	1	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	5	5	A.
Indiana	54	T.	12	....	....	....	....	....	....	....	....	....	....	....	....	....	....	14	1	....	1	....	....	....	....	....	....	....	....	....	....	....	....	28	4	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Indian Territory	7	T.	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1	1	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	3	3	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Iowa	122	T.	15	1	....	....	..	....	....	....	1	11	5	....	....	1	10	15	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	59	8	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	2	....	....	....	....	....	....	....	....	....	3	2	A.
Kansas	85	T.	....	....	....	....	....	....	....	....	5	1	1	....	....	1	7	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	16	6	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Kentucky	52	T.	2	2	....	....	....	1	....	....	....	....	....	....	2	3	3	6	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	20	8	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Louisiana	50	T.	2	2	4	3	2	3	3	4	5	....	....	....	....	4	6	....	3	2	2	....	....	....	....	....	....	....	....	....	....	....	....	45	14	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Maine	14	T.	....	....	....	....	....	....	....	2	1	1	....	4	....	....	....	....	....	....	....	....	....	....	....	....	....	1	..	....	....	....	....	9	5	T.
		A.	1	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	2	2	A.
Maryland	35	T.	1	4	....	....	....	....	....	1	....	....	....	....	....	....	....	12	2	..	....	....	....	....	....	....	....	....	....	....	....	....	..	20	5	T.
		A.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	2	2	A.
Massachusetts	94	T.	....	....	....	....	....	....	2	....	....	1	....	5	....	....	....	5	1	....	....	3	....	....	....	....	....	12	1	....	....	....	....	30	8	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Michigan	112	T.	9	....	2	1	4	5	....	....	....	1	2	3	10	1	4	7	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	50	13	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	2	1	A.
Minnesota	69	T.	4	....	...	11	5	4	1	....	1	2	1	9	2	8	3	..	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	52	13	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	1	1	A.
Mississippi	46	T.	1	....	2	2	....	1	...	1	1	....	...	1	....	2	...	..	3	3	. .	....	....	....	....	....	....	....	....	....	....	....	....	17	10	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Missouri	95	T.	....	...	....	....	....	....	4	7	4	....	....	....	2	10	23	...	....	....	....	....	....	....	1	5	....	....	....	....	....	1	....	56	8	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	A.
Montana	37	T.	....	1	2	....	....	1	2	1	....	..	..	....	2	....	....	....	..	....	....	....	....	1	1	....	....	....	4	2	1	....	....	18	11	T.
		A.	1	....	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....	....	1	....	....	1	....	....	1	....	....	....	....	....	....	6	6	A.
Nebraska	143	T.	2	....	....	7	1	1	....	1	6	6	2	....	...	7	8	1	1	.	....	....	....	1	....	1	....	....	....	....	....	....	....	45	14	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Nevada	48	T.	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1	...	3	....	....	2	3	....	4	....	....	....	1	....	....	15	7	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
New Hampshire	14	T.	...	....	....	....	....	....	....	....	....	....	....	7	....	....	....	2	....	....	....	1	....	....	....	....	....	5	....	....	....	....	....	15	4	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
New Jersey	55	T.	....	21	....	1	....	....	4	....	....	....	1	....	16	....	....	7	3	....	1	1	....	....	1	....	1	2	1	....	....	....	....	60	13	T.
		A.	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	2	A.
New Mexico	39	T.	....	2	2	2	...	....	....	2	2	2	4	1	6	....	....	2	....	1	....	....	1	....	5	4	....	....	....	1	....	....	....	37	15	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
New York	103	T.	3	10	....	....	1	1	4	....	...	....	1	...	18	....	...	9	....	....	....	1	....	....	....	....	....	6	1	....	....	....	....	55	11	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
North Carolina	59	T.	11	8	3	....	....	....	....	....	2	....	2	....	....	....	3	16	3	8	1	....	....	....	....	....	....	....	....	....	....	....	....	57	10	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
North Dakota	46	T.	..	3	....	....	....	1	....	2	....	....	....	....	1	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	11	5	T.
		A.	....	....	....	....	....	....	....	1	....	1	....	....	1	1	....	....	1	....	1	....	....	1	1	1	....	....	....	1	....	....	....	10	10	A.
Ohio	135	T.	39	....	....	....	....	....	....	....	....	....	....	....	....	....	4	44	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	88	4	T.
		A.	1	....	....	....	....	....	1	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	3	3	A.
Oklahoma	23	T.	....	....	....	....	....	....	....	2	2	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	6	4	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Oregon	62	T.	....	....	....	..	1	1	...	1	....	....	....	....	....	....	....	....	....	....	2	3	....	4	....	....	....	6	1	2	....	....	....	21	9	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Pennsylvania	105	T.	4	14	....	....	....	....	6	....	....	....	....	1	5	....	....	25	6	...	1	1	....	....	2	....	....	2	....	....	....	....	....	67	11	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Rhode Island	5	T.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	2	2	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
South Carolina	43	T.	4	2	2	....	2	....	....	....	....	2	....	....	....	....	1	2	7	6	7	....	....	2	....	....	....	....	....	....	....	....	....	37	11	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
South Dakota	44	T.	...	2	1	5	1	1	....	....	3	1	...	6	4	5	3	1	....	..	....	....	....	1	....	....	....	....	....	....	....	....	....	34	13	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Tennessee	65	T.	1	7	....	....	....	....	....	....	....	....	1	....	....	4	2	4	3	1	....	....	....	....	....	....	....	....	....	....	....	....	....	23	8	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Texas	85	T.	2	3	3	....	1	1	....	1	1	4	2	2	....	2	5	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	31	12	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Utah	41	T.	1	3	1	....	1	....	2	....	....	5	6	4	3	1	1	1	1	....	1	1	1	....	2	3	2	5	2	11	....	2	....	60	23	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Vermont	13	T.	....	....	....	....	....	....	....	....	....	....	....	6	....	....	1	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	....	9	3	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	1	....	....	....	2	2	A.
Virginia	49	T.	6	1	....	....	....	....	....	....	....	....	....	....	....	....	2	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	10	4	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Washington	50	T.	....	2	1	1	....	1	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	2	1	....	....	....	12	9	T.
		A.	...	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	A.
West Virginia	35	T.	1	2	1	....	....	....	....	....	....	....	....	....	....	....	....	7	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	13	5	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Wisconsin	61	T.	11	....	....	1	2	1	....	....	3	14	5	3	4	....	3	13	....	....	....	4	....	....	....	....	....	....	....	....	....	....	....	64	12	T.
		A.	....	....	....	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	4	....	....	....	....	....	....	....	....	....	....	9	3	A.
Wyoming	14	T.	....	....	....	....	....	....	....	....	....	2	....	1	1	1	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	6	5	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Sums	2,810	T.	167	119	31	44	43	37	34	56	54	84	65	49	123	54	95	259	70	29	37	27	18	19	28	29	22	55	21	30	18	15	....	1,732	....	T.
		A.	4	0	0	4	0	0	2	2	1	1	4	1	2	1	0	2	1	0	3	0	0	11	3	1	1	1	0	3	1	3	....	52	....	A.

TABLE X.—*Hourly sunshine as deduced from sunshine recorders, September*, 1897.

Stations.	Instrument.	Percentages for each hour of local mean time ending with the respective hour.																Hours of sunshine.			
		A. M.								P. M.								Total.			
		5	6	7	8	9	10	11	Noon	1	2	3	4	5	6	7	8	Actual.	Possible.	Percent of possible.	Personal estimate.
																		Hours.	*Hours.*		
Albany, N. Y	T.	.....	46	46	63	77	87	94	97	96	93	90	88	74	55	46	.....	294.7	375.0	79	60
Atlanta, Ga	T.	.....	60	57	58	65	70	74	75	73	69	63	63	57	54	53	.....	237.8	371.8	65	61
Atlantic City, N. J	P.	.....	72	70	77	86	86	78	77	80	80	82	81	82	80	93	.....	298.4	373.4	80	67
Baltimore, Md	T.	.....	53	60	66	72	78	87	82	82	83	88	82	66	57	35	.....	277.0	373.4	74	77
Binghamton, N. Y	T.	.....	34	39	45	55	75	82	82	81	83	74	69	66	65	69	.....	251.1	374.5	67	61
Bismarck, N. Dak	P.	.....	62	66	72	78	77	79	77	82	82	83	80	81	82	69	.....	292.7	376.9	78	73
Boston, Mass	T.	.....	58	66	69	73	72	80	82	82	81	66	55	55	52	49	.....	258.0	374.5	69	60
Buffalo, N. Y	T.	.....	33	30	46	59	70	78	83	85	84	78	76	72	62	52	.....	252.5	375.0	67	56
Charleston, S. C	T.	.....	57	53	61	75	66	63	62	48	54	60	59	44	43	49	.....	213.5	371.4	58	54
Chattanooga, Tenn	T.	.....	64	68	68	83	87	89	90	87	78	74	73	63	61	71	.....	284.4	372.0	76	66
Cheyenne, Wyo	P.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	58
Chicago, Ill	T.	.....	43	49	54	59	71	70	78	86	80	85	86	66	71	75	.....	264.5	374.5	71	71
Cincinnati, Ohio	T.	.....	54	60	62	80	92	96	96	97	97	95	94	84	50	47	.....	307.4	373.4	82	80
Cleveland, Ohio	T.	.....	58	55	62	67	81	88	95	86	85	77	69	60	54	56	.....	271.9	374.5	73	64
Columbus, Ohio	T.	..	72	78	83	94	94	96	98	87	98	93	87	87	86	80	.....	337.5	373.6	90	76
Denver, Colo	P.	.....	69	60	63	69	75	84	81	80	76	75	66	64	35	29	.....	256.7	373.6	69	47
Des Moines, Iowa	T.	.....	66	75	78	78	83	86	87	88	89	87	85	84	82	76	.....	310.5	374.5	83	80
Detroit, Mich	T.	.....	41	46	73	80	85	83	87	87	87	83	76	68	57	39	.....	279.3	374.5	75	69
Dodge City, Kans	P.	.....	83	83	83	87	92	93	91	90	90	83	85	82	73	81	.....	330.4	373.0	86	73
Dubuque, Iowa *	T.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Eastport, Me	P.	.....	43	51	58	65	67	61	49	50	51	54	52	51	43	51	.....	302.7	375.8	54	33
Erie, Pa	T.	.....	46	51	56	67	72	88	87	91	85	80	69	68	59	68	.....	269.4	374.5	72	59
Eureka, Cal	P.	.....	6	20	38	50	57	57	56	58	56	51	48	47	50	71	.....	180.4	374.0	48	50
Fresno, Cal	T.	.....	74	74	77	82	95	97	100	96	97	96	95	94	92	94	. ...	338.5	372.6	91	85
Galveston, Tex	P.	.....	33	62	77	82	82	85	86	82	85	87	87	85	58	3	.....	289.7	370.4	78	72
Harrisburg, Pa	T.	.....	62	65	73	78	87	86	89	92	90	87	90	85	70	64	.....	306.3	373.6	82	70
Helena, Mont	P.	.....	62	67	70	84	82	77	68	71	75	62	64	63	52	50	.....	260.9	376.9	69	67
Idaho Falls, Idaho	T.	.....	41	33	37	58	75	77	75	80	76	76	67	55	46	70	. ....	233.6	375.0	62	60
Indianapolis, Ind	T.	.....	83	87	87	92	96	97	97	95	93	91	88	84	83	80	.....	338.2	373.6	91	82
Kansas City, Mo	P.	.....	77	80	85	91	88	88	84	83	79	80	81	85	84	84	.....	313.0	373.4	84	80
Key West, Fla	T.	.....	32	45	58	71	78	74	69	72	73	65	53	34	22	3	.....	216.2	369.0	59	33
Little Rock, Ark	T.	.....	87	87	86	90	91	93	96	98	99	97	95	81	78	77	.....	337.8	372.0	91	74
Los Angeles, Cal	P.	.....	36	39	42	55	78	91	93	92	91	94	90	95	91	100	.....	291.2	371.8	78	65
Louisville, Ky	T.	.....	87	90	90	93	99	98	100	95	93	96	95	89	83	75	.....	347.0	373.0	93	84
Minneapolis, Minn	T.	.....	28	37	53	66	69	76	77	74	74	73	76	63	45	26	.....	239.1	375.8	64	.....
Nashville, Tenn	T.	.....	93	93	89	91	96	97	96	91	93	83	84	85	86	98	.....	337.0	372.2	91	86
New Orleans, La	T.	.....	45	50	49	55	62	65	64	71	70	62	56	45	43	22	.....	211.3	370.8	57	58
New York, N. Y	T	....	34	46	71	73	76	74	77	76	81	81	83	70	47	41	.....	261.4	374.0	70	67
Northfield, Vt	P.	.....	35	38	46	55	57	61	62	58	62	61	56	56	44	53	.....	262.8	375.4	54	47
Omaha, Nebr	P.	.....	73	73	81	82	89	87	92	98	98	93	90	86	81	69	.....	324.8	374.0	87	79
Parkersburg, W. Va	T.	.....	91	93	93	91	90	93	94	89	89	77	75	70	72	71	.....	319.6	373.4	86	77
Philadelphia, Pa	T.	.....	67	68	71	71	75	81	85	86	86	86	84	76	60	57	.....	287.4	373.6	77	62
Phœnix, Ariz	P.	.....	54	63	77	84	86	90	91	91	88	91	91	74	70	58	.....	304.8	371.4	82	66
Pittsburg, Pa	T.	...	16	17	18	28	44	58	71	78	74	68	63	57	48	50	.....	191.0	374.0	51	38
Portland, Me	T.	.....	35	49	75	79	86	91	87	87	88	84	80	67	49	29	.....	281.4	375.4	75	58
Portland, Oreg	T.	.....	19	23	27	30	36	40	58	68	63	59	54	49	43	22	.....	168.1	376.1	45	51
Portland, Oreg	P.	.....	19	25	28	32	32	35	47	61	59	56	51	55	51	22	.....	162.1	376.1	43	51
Raleigh, N. C	T.	.....	62	63	84	89	88	93	94	91	83	82	88	82	69	75	.....	309.7	372.2	83	69
Rochester, N. Y	T.	.....	44	40	38	50	51	61	54	59	67	65	58	51	55	67	.....	202.4	375.0	54	52
St. Louis, Mo	T.	.....	73	79	79	91	97	97	96	97	98	96	94	89	82	69	.....	337.7	373.4	90	86
St. Paul, Minn	P.	.....	46	58	66	71	73	77	75	72	75	74	75	78	67	46	.....	265.2	375.8	71	60
Salt Lake City, Utah	P.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	55
San Diego, Cal	P.	.....	28	23	30	49	72	89	93	97	98	93	94	93	83	91	.....	279.4	371.4	75	83
San Francisco, Cal	T.	.....	39	35	44	61	76	81	84	90	89	92	85	70	49	66	.....	263.1	373.0	71	63
Santa Fe, N. Mex	P.	.....	40	56	70	76	83	79	77	81	67	59	48	39	30	29	.....	234.0	372.2	63	49
Savannah, Ga	P.	.....	48	48	60	63	67	67	57	55	53	54	51	52	39	43	.....	205.6	371.4	55	51
Seattle, Wash	T.	.....	12	13	17	26	38	44	52	61	58	56	50	40	41	16	.....	150.9	377.5	40	44
Spokane, Wash	T.	.....	32	40	50	59	62	68	75	72	69	66	59	42	28	10	.....	210.4	377.5	56	50
Tampa, Fla	T.	.....	43	43	39	54	61	62	71	65	60	44	38	30	27	6	.....	178.3	369.6	48	46
Vicksburg, Miss	T.	.....	55	57	68	89	92	94	94	93	88	79	73	68	42	27	.....	286.3	371.4	77	73
Washington, D. C	P.	.....	68	66	71	73	77	80	85	88	83	81	83	84	82	89	.....	296.0	373.4	79	73
Wilmington, N. C. *	T.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

*Instrument out of order.

TABLE XI.—*Accumulated amounts of precipitation for each 5 minutes, for storms in which the rate of fall equaled or exceeded 0.25 in any 5 minutes, or 0.75 in 1 hour during September, 1897, at all stations furnished with self-registering gauges.*

Station.	Date.	Total duration.		Total am't of precipitation.	Excessive rate.		Amount before excessive began.	Depths of precipitation (in inches) during periods of time as indicated.												
		From—	To—		Began—	Ended—		5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
	1	2	3	4	5	6	7														
Albany, N. Y.	19-20			0.73														0.26			
Atlanta, Ga.	22			0.13														0.06			
Atlantic City, N. J.	2			0.23												0.20					
Baltimore, Md.	16			0.71														0.62			
Binghamton, N. Y.	2			1.01														0.39			
Bismarck, N. Dak.	10			0.06																	
Boston, Mass.	20	3.37 p. m.	6.25 p. m.	0.70	4.35 p. m.	5.00 p. m.	0.09	0.05	0.12	0.24	0.41	0.47									
Buffalo, N. Y.	13			0.17									0.15								
Cairo, Ill.	16			0.28							0.26										
Charleston, S. C.	21-22	9.50 p. m.	8.25 a. m.	1.34	7.05 a. m.	7.40 a. m.	0.32	0.06	0.11	0.17	0.26	0.39	0.61	0.75							
Chicago, Ill.	16			0.40														0.31			
Cincinnati, Ohio	16			0.48								0.40									
Cleveland, Ohio	16			0.32														0.23			
Columbus, Ohio	16			0.47											0.44						
Denver, Colo.	15-16			0.36														0.11			
Des Moines, Iowa	15			0.31											0.31						
Detroit, Mich.	1			0.66														0.61			
Dodge City, Kans.	9			0.29														0.29			
Duluth, Minn.	14-15			1.44														0.65			
Eastport, Me.	24			0.31						0.31											
Erie, Pa.	1-2			0.35														0.24			
Galveston, Tex.	2	2.36 p. m.	5.19 p. m.	1.05	2.40 p. m.	3.20 p. m.	0.01	0.11	0.21	0.24	0.31	0.34	0.45	0.68	0.77	0.80					
Harrisburg, Pa.	23-24			0.81														0.31			
Hatteras, N. C.*	3			1.02																	
Huron, S. Dak.	13			0.48														0.10			
Idaho Falls, Idaho	3			0.51														0.34			
Indianapolis, Ind.	1	3.15 p. m.	4.40 p. m.	0.49	3.28 p. m.	3.41 p. m.	0.01	0.08	0.31	0.37											
Jacksonville, Fla.	8	1.50 p. m.	5.45 p. m.	2.20	3.02 p. m.	3.52 p. m.	0.50	0.10	0.25	0.35	0.44	0.60	0.85	1.05	1.18	1.28	1.35				
Do	11	3.55 a. m.	8.45 a. m.	1.84	7.03 a. m.	7.55 a. m.	0.85	0.07	0.15	0.22	0.25	0.28	0.31	0.38	0.46	0.55	0.70	0.80			
Jupiter, Fla.	4	3.50 p. m.	11.00 p. m.	2.33	6.45 p. m.	7.25 p. m.	0.53	0.12	0.44	0.71	0.87	0.96	1.06	1.13	1.22	1.26					
Do	6	11.30 a. m.	5.45 p. m.	2.58	2.05 p. m.	3.00 p. m.	0.42	0.21	0.46	0.69	1.03	1.36	1.56	1.67	1.75	1.83	1.90				
Do	6-7	8.10 p. m.	D. N.	2.11	9.15 p. m.	9.45 p. m.	0.33	0.07	0.32	0.60	0.86	0.94	1.02	1.06							
Kansas City, Mo.	14-15			1.06														0.44			
Key West, Fla.	6	3.58 p. m.	8.30 p. m.	1.28	5.34 p. m.	5.45 p. m.	0.40	0.32	0.55	0.62											
Do	8-9	8.38 p. m.	D. N.	1.06	9.55 p. m.	10.10 p. m.	0.40	0.25	0.37	0.42											
Lincoln, Nebr.	16			1.01														0.42			
Little Rock, Ark.	13			0.17							0.16										
Louisville, Ky.	16			0.70								0.40									
Memphis, Tenn.†																					
Milwaukee, Wis.	16			0.27														0.26			
Montgomery, Ala.	13			0.46											0.34						
Nantucket, Mass.	20			0.36													0.35				
Nashville, Tenn.	2			0.09								0.09									
New Orleans, La.	17	1.55 p. m.	8.15 p. m.	2.31	2.29 p. m.	3.29 p. m.	0.04	0.09	0.22	0.32	0.43	0.49	0.59	0.68	0.78	0.95	0.98	1.20			
New York, N. Y.	2			0.56														0.53			
Norfolk, Va.	22-23			0.97													0.23				
Northfield, Vt.	19-20			0.58														0.12			
Oklahoma, Okla.	14			0.87														0.38			
Omaha, Nebr.	15-16	7.40 p. m.	9.15 a. m.	1.14	1.40 p. m.	2.40 p. m.	0.14	0.09	0.17	0.25	0.32	0.39	0.44	0.49	0.55	0.60	0.64	0.73	0.80		
Parkersburg, W. Va.	16			0.31								0.25									
Philadelphia, Pa.	2			0.63														0.55			
Pittsburg, Pa.	16			0.33						0.29											
Portland, Me.	20			0.91														0.38			
Portland, Oreg.	6			0.50														0.46			
Raleigh, N. C.	22-23			0.47														0.10			
Rochester, N. Y.	20			0.12														0.07			
St. Louis, Mo.	16			0.07														0.06			
St. Paul, Minn.	9-10			0.47											0.25						
Salt Lake City, Utah	12			0.34														0.22			
San Diego, Cal.	18			T.																	
San Francisco, Cal.	30			0.08														0.02			
Savannah, Ga.	21-22	4.05 a. m.	10.15 a. m.	2.97	12.20 a. m.	1.50 a. m.	1.36	0.05	0.10	0.19	0.25	0.30	0.35	0.40	0.43	0.45	0.49	0.56	0.80	0.95	1.00
Seattle, Wash.	2-3			0.84														0.30			
Spokane, Wash.	7-8			0.62														0.12			
Tampa, Fla.	16	1.50 p. m.	2.12 p. m.	0.81	1.53 p. m.	2.03 p. m.	0.05	0.40	0.80												
Do‡	20-21	11.33 a. m.	D. N.	6.56	9.00 p. m.	9.35 p. m.	2.65	0.10	0.30	0.50	0.80	1.00	1.15	1.25	‡	‡	‡	‡	‡	‡	2.25
Vicksburg, Miss.	12-13			0.09							0.09										
Washington, D. C.	23			0.65														0.30			
Wilmington, N. C.	19			0.51														0.27			
Yankton, S. Dak.	10			0.50														0.11			

*Self register out of order. † No precipitation during the month. ‡ Record defective during greater part of storm. From 3 to 4 p. m. 1.15 inches fell with a maximum fall of 0.60 inch in ten minutes, also from 9 p. m. to 12 midnight, estimated that 3 inches fell.

TABLE XII.—*Excessive precipitation, by stations, for September, 1897.*

Stations.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Arizona.	*Inches.*	*Inches.*		*Ins.*	*h. m.*	
Glendale				1.00	1 00	11
Mount Huachuca				1.48	1 00	13
Phœnix				1.89	0 55	11
Arkansas.						
Picayune				1.70	1 30	9
Colorado.						
Gold Hill		2.63	11			
Florida.						
Amelia	20.88	12.40	19–22			
Do		3.82	28–29			
Bartow	11.94	4.38	20			
Boca Raton	15.97					
Brooksville		4.40	20–21			
Carrabelle	10.60	5.80	11–12			
Do		3.90	28			
Clermont		4.94	20–21			
Earnestville	10.02	5.10	20–21	1.51	1 30	5
Eustis	12.72	5.70	20–21			
Federal Point	17.30	5.83	20–21	1.01	1 00	18
Do		3.92	28–29			
Fort Meade	16.36	3.28	4			
Do		4.34	20			
Frostproof	10.01	2.87	20			
Grasmere	10.96	5.07	20–21			
Huntington	12.29	5.74	20–21			
Jacksonville	16.23	5.35	21–22	1.40	1 00	8
Jupiter	18.09	3.11	4–5	1.61	1 25	4
Do		4.69	6–7	2.01	1 00	6
Do		2.64	26–27	1.23	1 00	6
Key West		2.68	6–7			
Kissimmee	15.20	9.50	20–21			
Lemon City	20.35	10.25	4–7			
Macclenny		2.86	20–21			
Manatee		3.00	20			
Merritts Island	17.97	4.20	20–21	1.04	0 45	8
Do		5.43	28–29			
Mullet Key		3.80	20–21			
Myers	10.45					
New Smyrna	17.03	8.14	20–21			
Do		3.36	28–29			
Ocala		5.85	20–21			
Orange City	14.03	3.49	11			
Do		4.45	20–21			
Orange Park	12.70	4.00	21			
Orlando	15.77	4.38	11			
Do		7.04	20–21			
Oxford	14.00	3.00	6	2.00	2 00	11
Do		7.50	20–21			
Plant City		4.35	20–21			
St. Francis	12.87	2.61	11			
Do		6.07	20–21			
St. Francis Barracks	12.97	4.45	20–21			
Do		2.55	28			
Sebastian	23.01	6.11	24–25			
Switzerland		5.51	20–21			
Tampa	10.73	6.56	20–21	1.25	0 50	8
Do				1.45	1 00	20
Tarpon Springs		5.60	20–21			
Georgia.						
Augusta		3.17	21–22			
Brunswick	11.94	4.28	21			
Camak		3.30	22			
Fleming	11.24	3.00	18			
Do		2.50	21	2.50	0 40	21
Jesup		4.40	18–19			
Savannah		2.88	21–22			
Washington		3.45	22			
Iowa.						
Ames		2.65	16			
Atlantic		3.30	16			
Centerville				2.20	0 30	12
Eldora		2.50	16			
Grundy Center				1.60	0 50	16
Hampton		2.53	1			
Hopeville		3.14	15–16			

TABLE XII.—*Excessive precipitation*—Continued.

Stations.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Iowa—Continued.	*Inches.*	*Inches.*		*Ins.*	*h. m.*	
North McGregor		2.70	1–2			
Do		2.81	15–16			
Osage		2.88	1			
Wilton Junction		2.91	1–2			
Louisiana.						
New Orleans				1.20	1 00	17
Port Eads		5.16	5			
Minnesota.						
Bonniwell		4.00	1			
Glencoe		2.68	1			
Maplelain				1.76	0 25	4
Morris		3.00	12			
Rolling Green				1.00	0 20	15
Mississippi.						
Windham				1.27	0 30	17
Nebraska.						
Arapaho		3.50	10	3.50	2 00	10
Ashland		3.20	16			
Burchard		3.50	16			
Dawson		2.55	16			
Nemaha		3.55	10–11			
Odell		3.95	15	3.95	1 20	15
O'Neill		2.82	8–9			
Weeping Water		2.56	16			
New York.						
Bedford				1.00	0 50	2
Honeymead Brook				1.00	1 00	2
Ohio.						
Atwater				1.00	1 00	1
Oklahoma.						
Hennessey		3.50	10			
Do		4.00	16			
Kingfisher		4.62	10	4.62	2 30	10
Prudence		2.50	16			
Pennsylvania.						
Chambersburg		2.58	23			
Rhode Island.						
Block Island		2.56	2			
South Carolina.						
Batesburg		3.00	23			
Blackville		2.89	22–23			
Conway				1.39	0 45	19
Edisto		3.78	22–23			
Mount Carmel		2.78	22–23			
Pinopolis		2.75	21–22			
St. Matthews		4.48	22–23	1.04	1 00	20
Spartanburg				1.10	0 30	2
Trenton		2.83	22			
Trial		3.37	21–22			
Tennessee.						
Elizabethton				2.04	0 25	17
New Market		2.52	17			
Texas.						
Arthur City		2.65	9–10			
Austin		2.50	13			
Burnet		3.17	13			
Childress				1.08	0 45	10
Colmesneil		3.03	12			
Conroe		4.03	12			
Duval		2.70	13			
Forestburg				1.75	0 30	13
Georgetown		4.05	13			
Golindo		2.80	13			
Hewett		2.90	13			
Luling				1.09	1 00	7
Temple		3.00	13			
Weatherford		2.70	13–14			
Virginia.						
Callaville				1.01	1 00	
Wisconsin.						
Prairie du Chien		2.65	1			
Do		2.81	15–16			
Spooner		2.75	3–4			

Chart I. Tracks of Centers of High Areas, September 1897

Chart I. Tracks of Centers of High Areas. September, 1897.

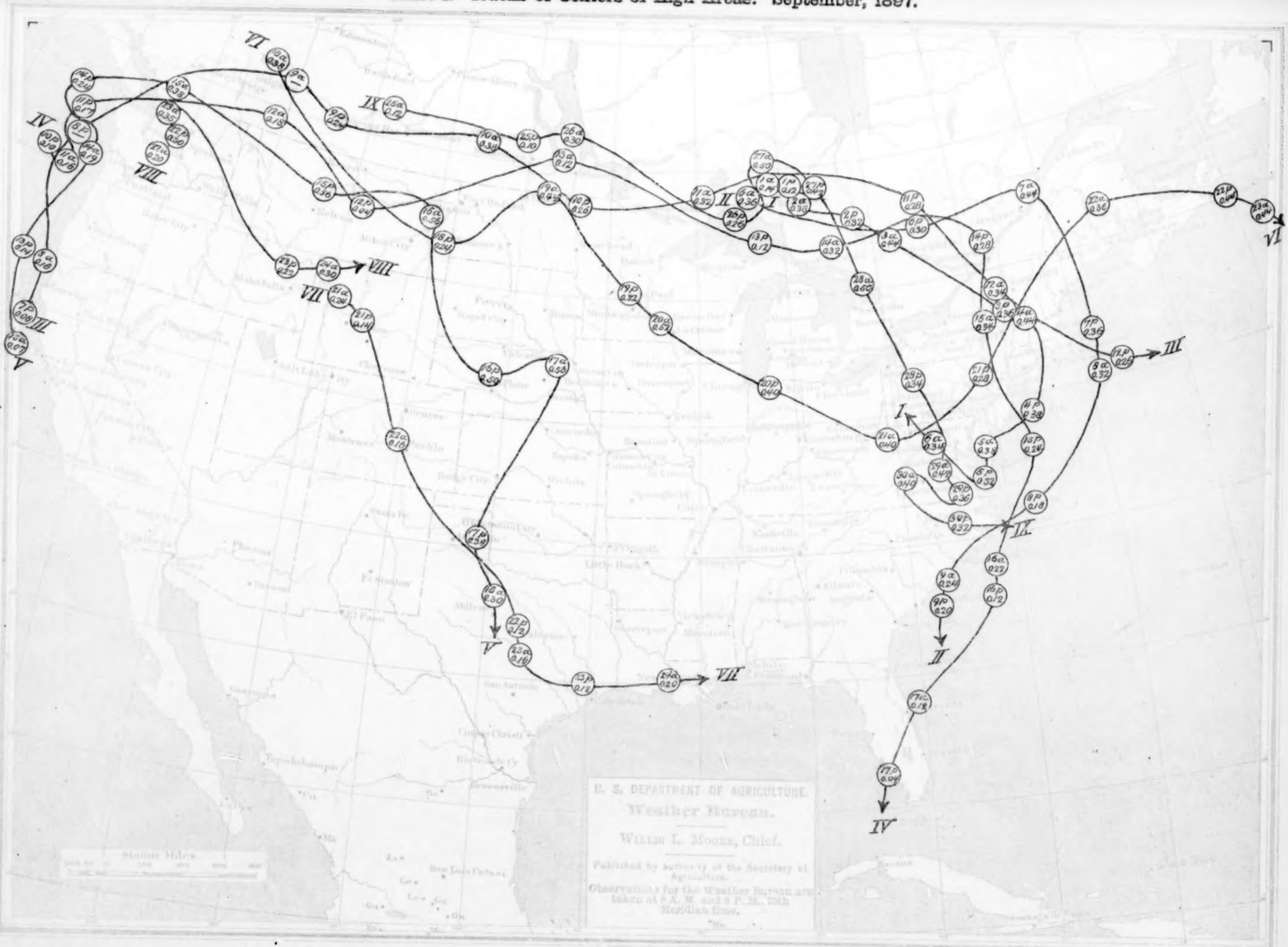
U. S. DEPARTMENT OF AGRICULTURE.
Weather Bureau.
Willis L. Moore, Chief.
Published by authority of the Secretary of Agriculture.
Observations for the Weather Bureau are taken at 8 A. M. and 8 P. M., 75th Meridian time.
Statute Miles

Chart II. Tracks of Centers of Low Areas. September, 1897.

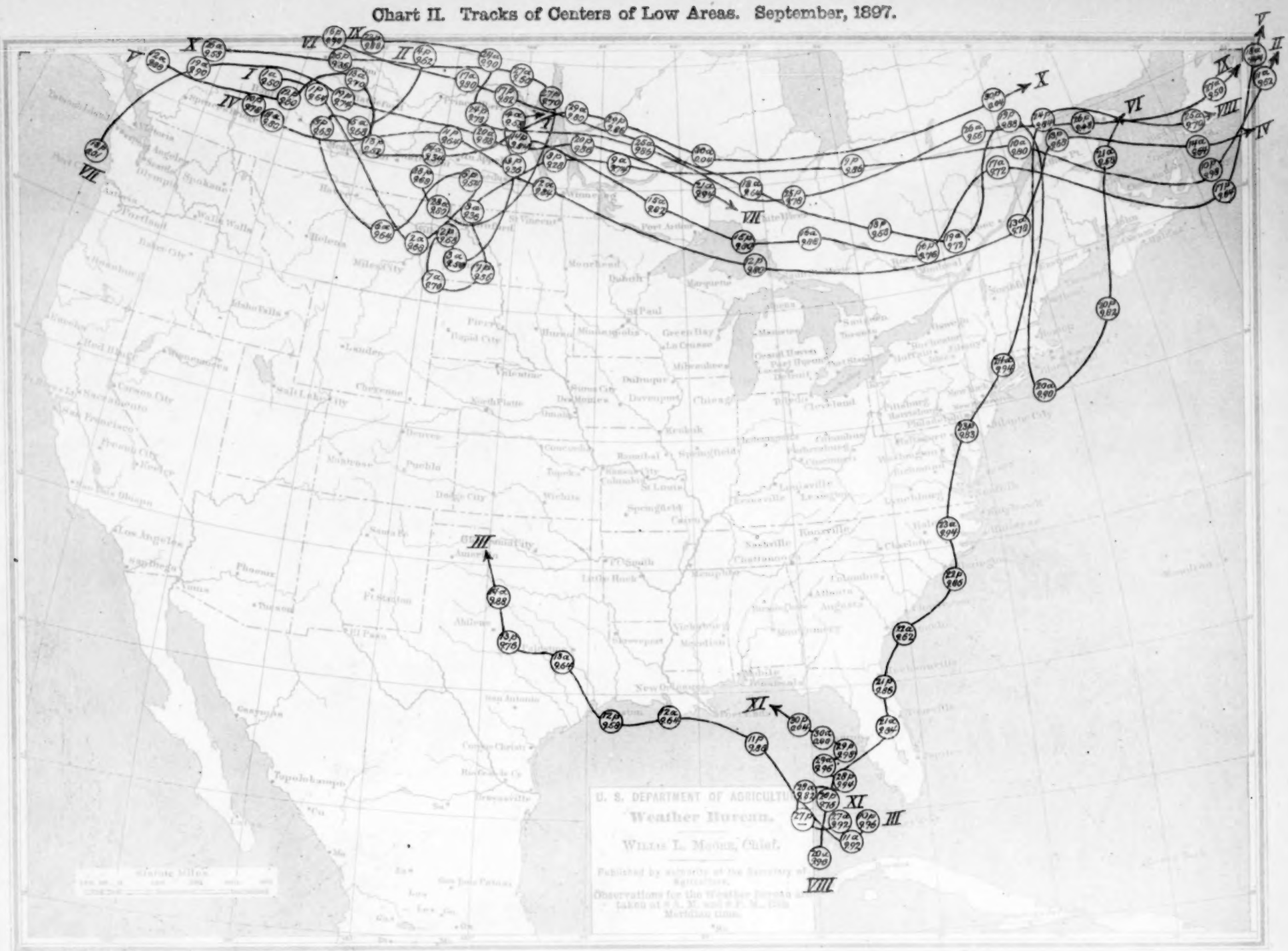

Chart III. Total Precipitation. September, 1897.

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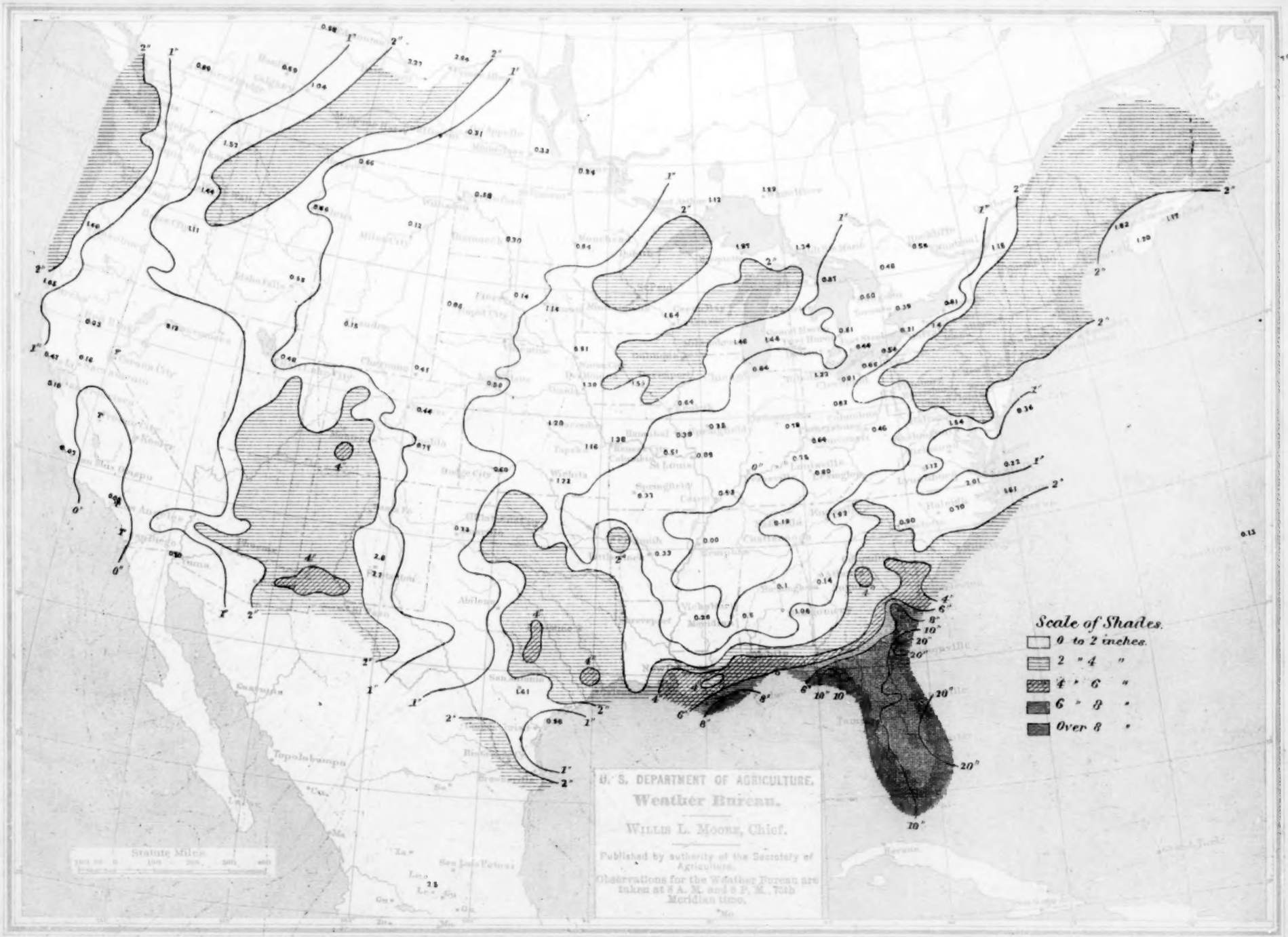
Scale of Shades.
0 to 2 inches.
2 " 4 "
4 " 6 "
6 " 8 "
Over 8 "
U. S. DEPARTMENT OF AGRICULTURE.
Weather Bureau.
WILLIS L. MOORE, Chief.
Published by authority of the Secretary of Agriculture.
Observations for the Weather Bureau are taken at 8 A. M. and 8 P. M. 75th Meridian time.
Statute Miles

Chart IV. Isobars, Isotherms, and Resultant Winds. September, 1897.

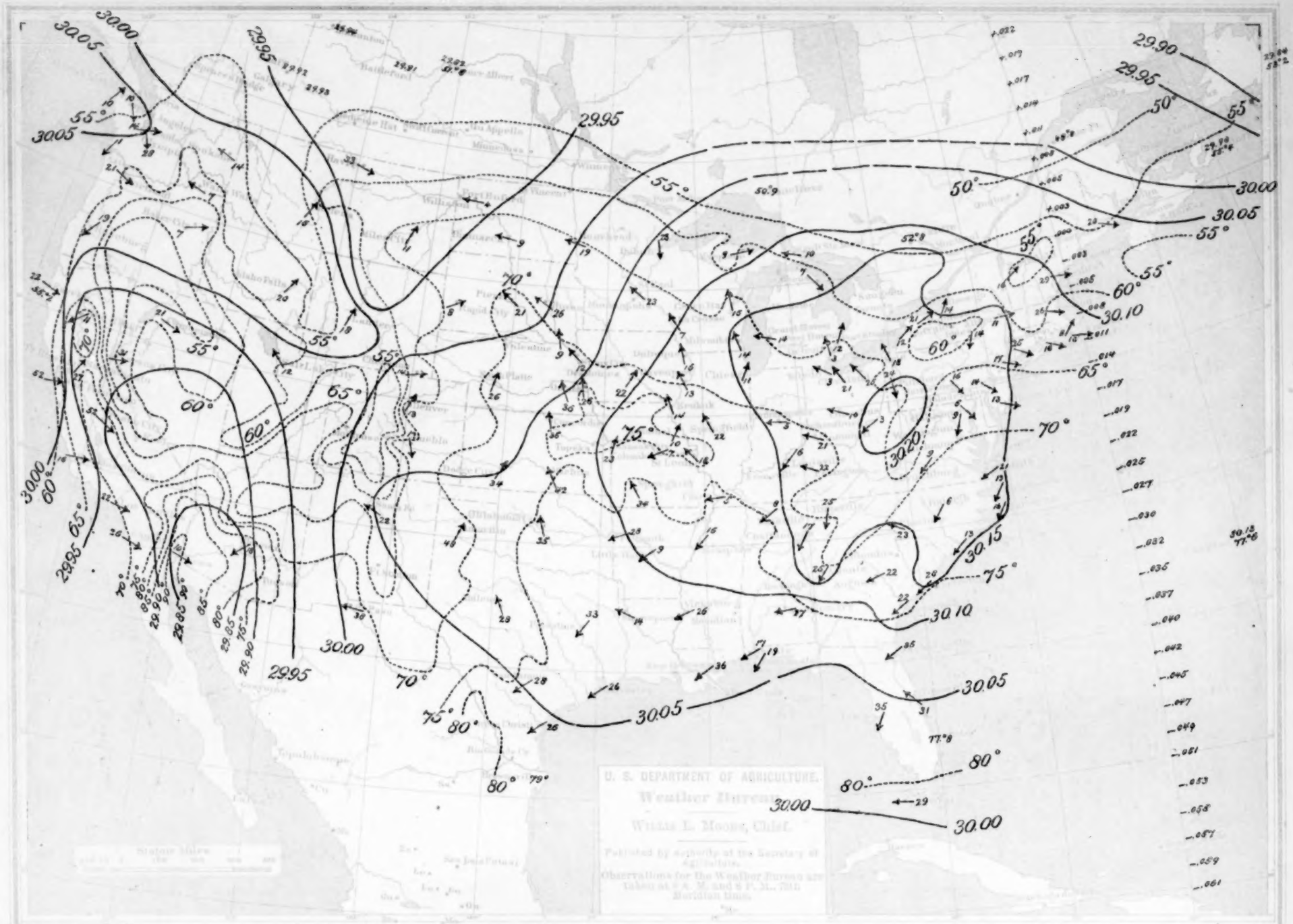

Chart V. Hydrographs for Seven Principal Rivers of the United States.

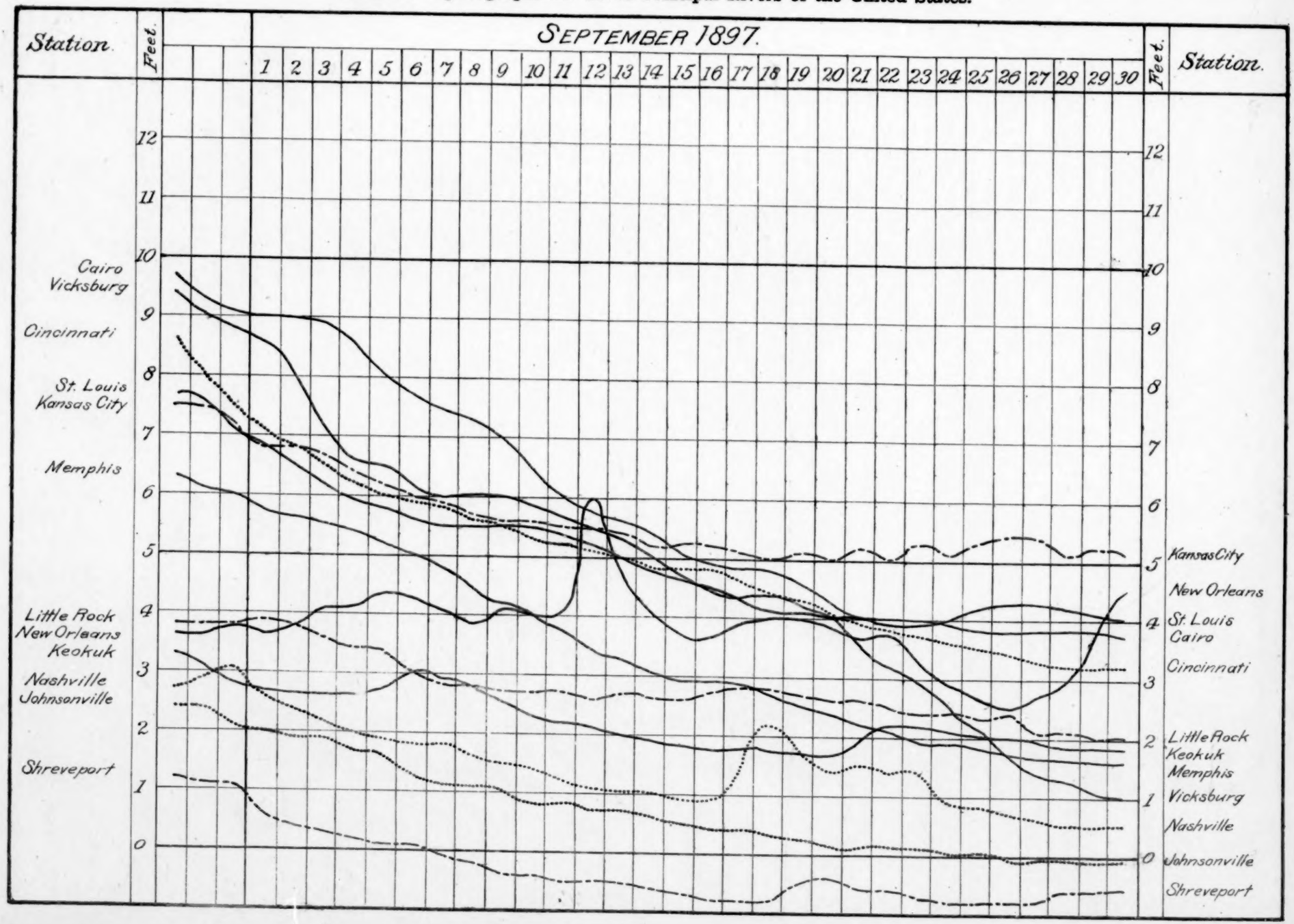

Chart VI. Map of East Hill, Cattaraugus, County, N. Y.

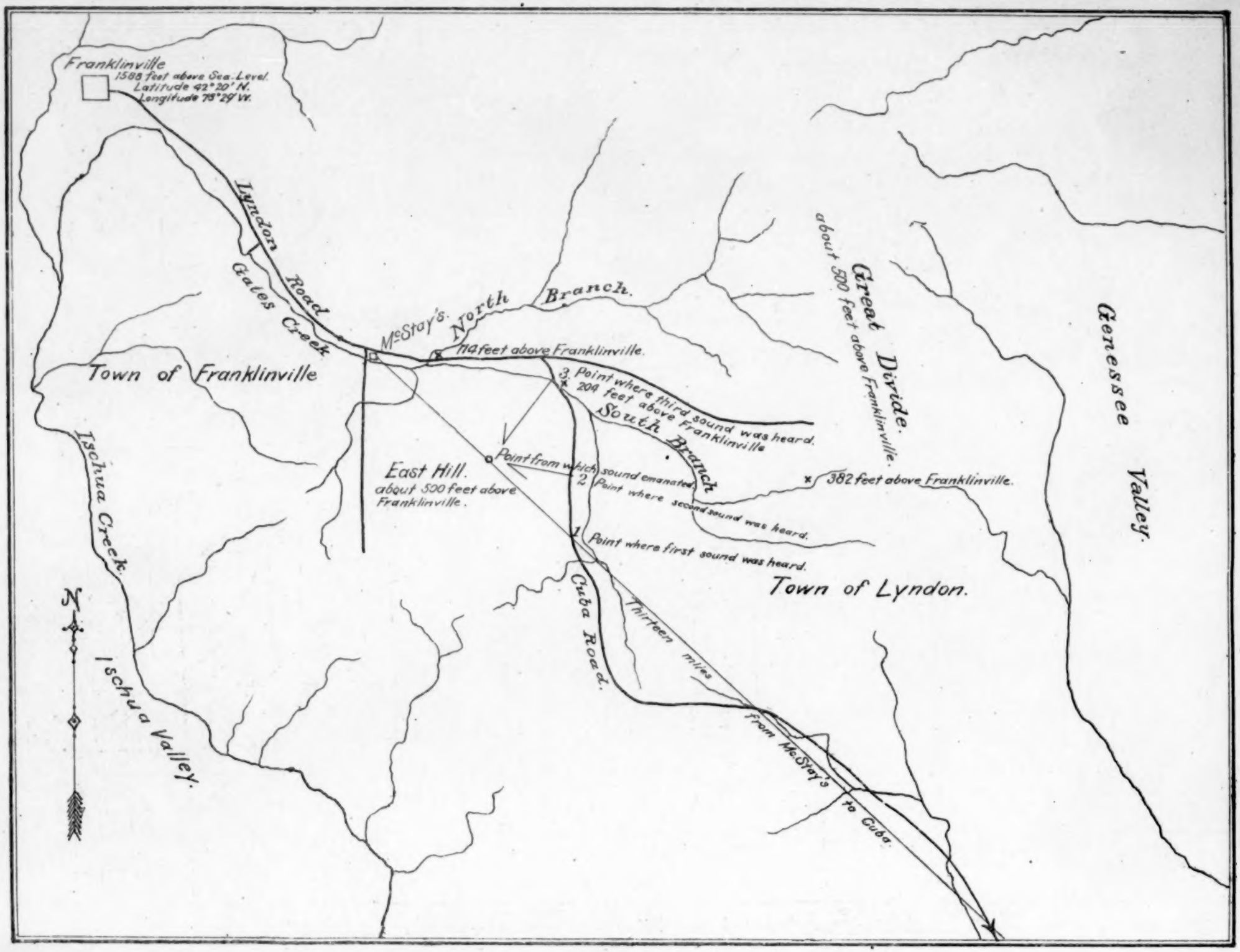

Chart VII. Cloudiness in Path of Total Eclipse of May 28, 1900.

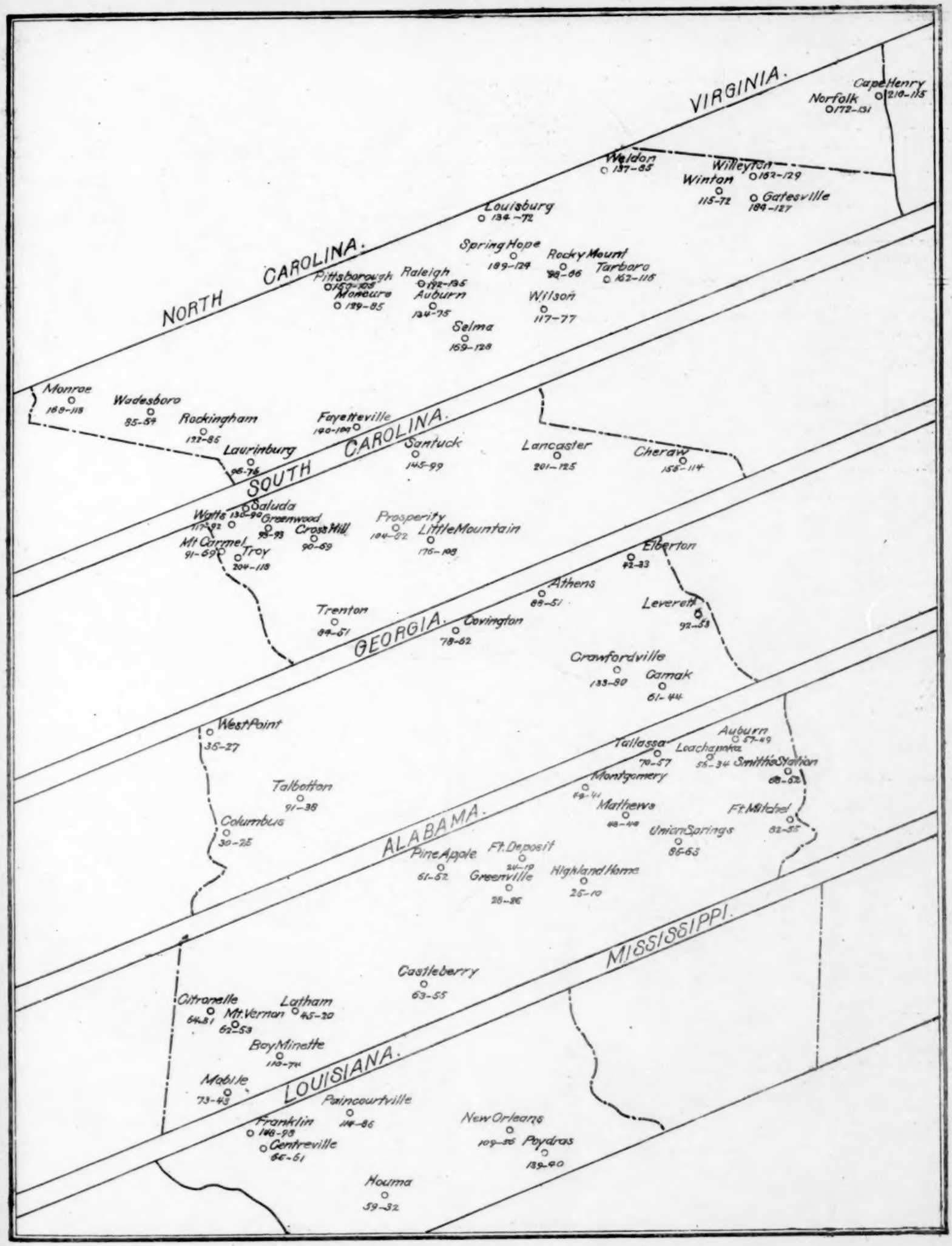
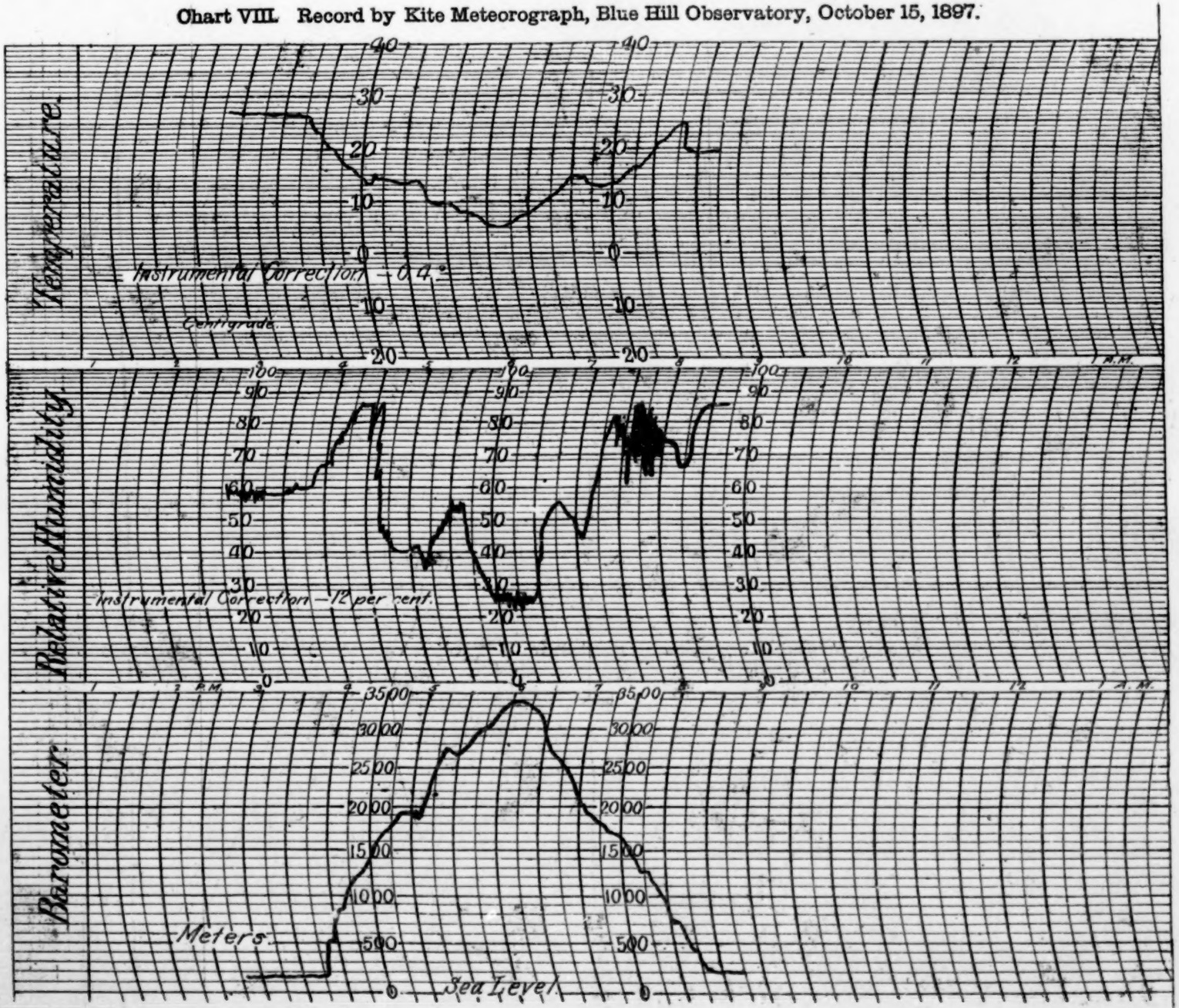
Chart VIII. Record by Kite Meteorograph, Blue Hill Observatory, October 15, 1897.